

**Texas Natural Resource
Conservation Commission**



The Statewide Watershed Management Approach for Texas

***The TNRCC's Framework for Implementing
Water Quality Management***

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Prepared by the
Office of Water Resource Management
with assistance from
The Cadmus Group, Inc., Durham, North Carolina

March 1997



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Acronyms

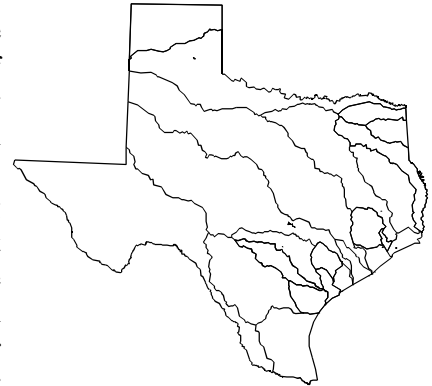
BEAT	Border Environmental Assessment Team
CRP	Clean Rivers Program
CRPT	Clean Rivers Program Team (Watershed Management Team)
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
GIS	Geographic Information System
NCBs	Nueces Coastal Basins
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source Pollution
OPPR	Office of Pollution Prevention and Recycling
OWRM	Office of Water Resource Management
QA	Quality Assurance
QAPP	Quality Assurance Project Plans
QA/QC	Quality Assurance/Quality Control
RGB	Rio Grande Basin
SWQM	Surface Water Quality Monitoring
SWQS	Surface Water Quality Standards
TAC	Texas Administrative Code
TMDL	Total Maximum Daily Load
TNRCC	Texas Natural Resource Conservation Commission
TRACS	Texas Regulatory Activities and Compliance System
WQ	Water Quality

Chapter 1

Introduction

Purpose

The Texas Natural Resource Conservation Commission (TNRCC), one of the lead agencies responsible for protecting and restoring the quality and quantity of Texas' water resources, has identified areas where current water quality management program efficiency, effectiveness, and continuity can be improved through a statewide watershed management approach. This document provides background information and guidance for staff within the TNRCC for integrating and coordinating key program functions through a watershed management approach. Readers outside the agency will find this document helpful if they are interested in participating in or supporting watershed management activities in their watershed. The TNRCC welcomes and encourages any agency, group, or individual having an interest in water resources to contact the Office of Water Resource Management (OWRM) with suggestions on how their participation can strengthen the watershed approach outlined in this document.



The following chapters describe the major components of the TNRCC's approach and explain how each component will help achieve agency goals and objectives. Roles and responsibilities for specific TNRCC programs are identified, along with a plan for smooth transition to implementation. Staff will use this document as guidance when developing and implementing their program work plans, beginning with plans for fiscal year 1997.

What is Watershed Management?

Watershed management is not a new regulatory program. It is a way to coordinate the operations of existing water resource programs to better achieve water resource management goals. The watershed management approach outlined in this document is founded on existing state and federal statutes established for water quality management.

The term "watershed," in this context, is broadly defined as the geographic delineation of an entire water body system and the land that drains into it. Because of their readily identifiable boundaries, watersheds provide a functional geographic unit for coordinating management efforts. Watershed management will use watersheds as an organizing principle for TNRCC activities, based on the premise that the protection and restoration of water resources are best addressed through integrated efforts within hydrologically defined watersheds or basins.

Watershed management is a resource-centered approach involving several steps to achieve the overall goal of maintaining water quality. Success is measured in terms of improving and maintaining environmental quality and protecting public health. Implementation fosters the protection and restoration of specific water uses such as drinking water supply, aquatic life habitat and propagation, recreation, and irrigation. Sound water resource management decisions depend on understanding the relationship between water quality, water use, and conditions within the watershed. Therefore, accurate watershed assessments based on representative data and targeted monitoring are essential components. Assessments characterize physical, chemical, hydrological, and biological conditions of water bodies, identify sources and causes of water resource contamination and degradation, and evaluate the effectiveness of various management actions. The culmination of watershed-based assessments is the implementation of existing regulatory and nonregulatory management solutions that address local water resource priorities. These watershed management activities are interdependent and encompass numerous functions of the TNRCC and other management organizations. Because several different programs and agencies perform these activities, significant coordination is essential to successful management.

Why Watershed Management?

Existing TNRCC water quality management programs and their standard operating procedures have evolved over the past 25 years in response to the agency mission and changes in statutory requirements. Throughout the development of this document, the TNRCC and other parties interested in water resource management identified a variety of current operating procedures and activities which were in need of improved coordination and refinement. Changes to the current process of water quality management are therefore necessary to more effectively meet the objectives and requirements of statewide water quality standards and water quality statutes. Aspects of current programs in need of improvement include, but are not limited to

- 💧 the methodology for selecting priority watersheds as required by the federal Clean Water Act §303(d);
- 💧 the development and implementation of total maximum daily loads (TMDLs) as required by the federal Clean Water Act §303(d);
- 💧 the coordination of the assessment activities and reporting requirements of the TNRCC surface water quality monitoring programs, the Nonpoint Source Program, and the Clean Rivers Program;
- 💧 water quality monitoring plans to support evaluation of water quality standards compliance, wastewater permitting, and TMDLs;
- 💧 programmatic limitations in the allocation of federal and state funds;
- 💧 the monitoring and characterization of nonpoint source pollution loadings ;
- 💧 the timing and sequence of program outputs;
- 💧 the timing and availability of opportunities for local participation throughout the water quality management process.

Acknowledging these needs, the TNRCC has established a framework for coordinating and implementing existing programs through a watershed-based approach. The watershed management approach is the logical progression for the TNRCC's water quality management programs. Its implementation provides the method for the development of TMDLs and the establishment of appropriate water quality standards throughout the state.

Specifically, the watershed management approach provides the process necessary for the

- 💧 implementation of a consistent, scientific method for selecting priority watersheds which will provide the rationale for targeting limited state and federal funding;
- 💧 preparation of TMDLs for priority watersheds as required by the Clean Water Act §303(d);
- 💧 consolidation of surface water quality reporting requirements mandated by the Clean Water Act §§305(b) and 319(h), and the Clean Rivers Program;
- 💧 assessment of the scientific data required to allow flexible regulatory decisions (e.g., wastewater permits) that recognize geographic differences in climate, topography, and demographics that affect water resources;
- 💧 better coordination and consolidation of objectives between existing water quality management programs at the local, regional, and state levels;

- 💧 establishment of a “market-based” environmental policy for pollutant trading;
- 💧 initiation of a consistent, continuous forum for intergovernmental coordination, which is required to develop water pollution control strategies (pollution reduction goals, point and nonpoint source pollutant allocations) that cross program purviews and political jurisdictions.

How is the TNRCC Developing the Approach?

Extensive planning has gone into the development of a statewide watershed management approach in Texas. The TNRCC and the U.S. Environmental Protection Agency (EPA) collaborated to fund the development of this guidance document. The Cadmus Group, Inc., a consulting firm with extensive experience helping states develop statewide watershed management frameworks, assisted the TNRCC in developing the document. Also, the TNRCC held numerous meetings with representatives of stakeholder interests,¹ as well as work groups within the TNRCC in 1995 and 1996, to identify opportunities and constraints associated with converting existing program activities to a watershed-based approach. During these meetings, the TNRCC obtained valuable input on expectations of stakeholders and needs of existing water quality management programs.

Initial Focus

The TNRCC is committed to implementing its watershed management approach through its existing water quality management programs and in accordance with its mandates. Initial efforts will concentrate on the agency’s OWRM and Field Operations Division, focusing on coordinating and integrating watershed assessment, monitoring, modeling, toxicity evaluation, nonpoint source pollution, ecosystem research, water quality standards, and wastewater permitting. Throughout fiscal years 1997–1998, emphasis will be placed on synchronizing program work plans and outcomes with the statewide schedule for implementation, improving public participation through the basin steering committees (described on pages 4-6), and moving from assessment of water quality issues to developing management strategies for priority watersheds.

Long-Term Commitment

The TNRCC envisions a dynamic, flexible framework for watershed management in which all interested programs and parties can participate. As opportunities arise, the TNRCC may integrate additional agency program activities. Participation and contributions to the watershed management approach by organizations or individuals outside the TNRCC will be continuously promoted.

Goals and Objectives

Part of the TNRCC’s overall mission is to ensure a safe, clean, and affordable water supply for Texas. In an effort to refine its existing water resource goals, the TNRCC conducted an evaluation of its water quality program. In response to these recommendations and the programmatic needs identified by the Office of Water Resource Management, the TNRCC established the following goals and objectives to guide the short- and long-term direction of the statewide watershed management approach. Since the watershed approach is not a new program, but is simply an improved process for consolidating multiple program objectives, more attention will be focused on water resource protection and restoration than on individual program outputs.

¹ A stakeholder is defined as any entity involved in or affected by watershed management activities within a watershed, including the general public and the regulated community. For a description of stakeholders, see “Stakeholder Involvement,” p. 2-11.

Goal 1: Implement a Consistent Method for Establishing Total Maximum Daily Loads

The point source pollution control approach of Texas' water quality management programs has matured and become successful. However, many different nonpoint pollutant sources continue to threaten public health and ecosystems in Texas. The regulatory control of point source dischargers alone cannot adequately protect and restore water quality. Under the federal Clean Water Act §303(d), the TNRCC is required to establish load allocations for point and nonpoint source pollutants in water bodies that do not meet their designated use. Coordinated regulatory and nonregulatory solutions at the watershed level are necessary to address the combined effects of point and nonpoint source pollution.

Short-Term Objectives

1. Implement a consistent methodology for selecting high-priority watersheds as required by §303(d) of the federal Clean Water Act.
2. Adopt a schedule for development of TMDLs for high-priority watersheds.
3. Establish consistent methods and means for identifying, evaluating, and selecting management alternatives and funding mechanisms to achieve point and nonpoint source pollution load allocations in priority watersheds.
4. Establish a regular forum for continuous coordination with other agencies and organizations with management authority of nonpoint source pollution.

Long-Term Objective

Implement innovative techniques, such as pollutant trading for managing pollution sources within a watershed.

Anticipated Benefits

1. Improved process for targeting, evaluating, and addressing local water resource issues in each basin.
2. Improved compliance with the federal Clean Water Act and attainment of state water quality standards.
3. Consolidation of multiple water quality program objectives and resources to focus on the development of TMDLs.

Goal 2: Increase the Flexibility of TNRCC Operations to Accommodate Geographic Differences in Local/Regional Water Resource Priorities

Texas contains 11 distinct ecoregions, from desert in the West to coastal wetlands in the East. Numerous stakeholder groups have expressed concerns that certain federal and state water resource management requirements, such as water quality standards, may be too stringent to accommodate such variations in local conditions. With such great ecological diversity across the state, it is essential to provide flexibility in TNRCC programs and policy to accommodate geographic differences among local water resource issues.

Short-Term Objectives

1. Coordinate and target TNRCC programs and activities to make better use of site-specific data in order to establish designated uses, water quality standards, and permit effluent limits that reflect local conditions.
2. Obtain commitments necessary to update, maintain, and report the priority water body list required by CWA §303(d) on a watershed-by-watershed basis rather than producing a statewide list every two years.

Long-Term Objective

Identify strategies and adopt alternatives to achieve water quality protection goals, such as creating additional categories for designated uses and water quality criteria.

Anticipated Benefits

1. Improved process for targeting, evaluating, and addressing local water resource issues in each basin.
2. More balanced combinations of regulatory and nonregulatory management strategies that are tailored to meet basin-specific issues.
3. Enhanced working relationships between the TNRCC and other stakeholders through greater attention to local issues and priorities.

Goal 3: Implement Cost-Effective Solutions to Water Quality Problems

In a climate of decreasing budgets and increasing demands, governmental and private organizations are searching for ways to make the best use of limited funds, such as the use of in-kind services to match federal grant monies. Organizations responsible for contributing funds to support water resource management are demanding more return on their dollar. The TNRCC will streamline its operations to promote and develop cost-effective solutions focused on achieving environmental results.

Short-Term Objectives

1. Provide facilitation and technical support to basin steering committees to identify, evaluate, and select cost-effective management options.
2. Establish a formal process for translating local watershed priorities (as determined by CRP contractors and basin steering committees) into TNRCC work priorities.
3. Improve the ability of TNRCC to identify watersheds where rapidly growing rates of land disturbance or other contaminant sources are likely to impair water quality, and recommend protection measures to prevent costly restoration.

Long-Term Objectives

1. Develop decision support tools (e.g., environmental indicators and criteria for ranking watershed-specific water resource issues) to help plan and implement geographically based, cost-effective management strategies.
2. Identify opportunities to better integrate pollution prevention concepts into the operations of the TNRCC's water-quality-related programs.
3. Coordinate the federal grant process with watershed implementation to augment existing state and local programs. This will maximize the efficiency of state matching dollars and decrease reliance on state general revenues.
4. Establish, track, and report to the state and federal governments, an appropriate list of environmental indicators, outcome measures, and output measures for water quality management programs.

Anticipated Benefits

1. Greater protection of water resources in Texas by focusing efforts on the actual resource rather than on program outputs.

2. Increased confidence on the part of the regulated community and general public that private and public funds are being used wisely to make a difference in the protection of resources.
3. Improved TNRCC staff morale through greater assurance that their efforts are being targeted to achieve the highest environmental benefit for each dollar spent.
4. Less reliance on general revenue for some TNRCC programs, and use of CRP and local funds to leverage federal dollars at no additional cost to the state treasury.

Goal 4: Increase the Scientific Validity of Water Resource Management Decisions

The public wants water resource management decisions to be based on scientifically valid data that reflect local conditions. In the absence of sufficient, accurate, and timely data, some water resource management decisions can have unnecessarily costly impacts on the regulated community and the public. Additionally, water quality data collected by multiple organizations are often contradictory because uniform quality assurance and quality control methods are not used across organizations. To adequately address these issues, it is essential to collect geographically targeted data through common, scientifically sound methods. The TNRCC will use a coordinated monitoring approach to improve its information base and decision-making criteria and to ensure a comprehensive, uniform quality assurance/quality control plan for all data gathering activities.

Short-Term Objectives

1. Improve the protocols and guidance for obtaining sufficient data (e.g., chemical, physical, biological, and hydrological) to evaluate unclassified waters, revise water quality criteria and standards, establish total maximum daily loads (TMDLs), and set wastewater effluent limits.
2. Expand the TNRCC's historical focus on monitoring and assessment of point source impacts to include nonpoint source impacts within watersheds.
3. Provide consistent and timely technical support to each basin steering committee.
4. Require the use of the TNRCC's quality assurance/quality control plan for use by all water quality monitoring partners.

Long-Term Objectives

1. Implement monitoring and assessment protocols that support additional water quality criteria (e.g., fecal coliform, sediment, biological communities, and chlorophyll *a*) and coincide with sampling requirements of water quality standards.
2. Develop and use geographic information systems and hydrologic models as decision support tools.

Anticipated Benefits

1. Availability of a broader database of water resource information from which to establish the status and trends of water quality throughout the state.
2. More consistent and efficient process for collecting, updating, analyzing, and distributing data.
3. Increased stakeholder support of TNRCC management decisions and actions based on scientifically valid information, potentially reducing legal challenges and increasing success.

Goal 5: Improve the Administrative Efficiency of the TNRCC's Water Resource Programs

Many water resource management programs operate under specifically defined mandates, and program managers are restricted from considering information outside these mandates in making their decisions. This fragmented response to water quality issues results in duplication of effort, poor communication between programs, and conflicting priorities. By synchronizing water quality programs through a watershed management approach, the TNRCC can improve administrative efficiency.

Short-Term Objectives

1. Coordinate and combine annual work plans of TNRCC surface water quality programs to synchronize with the proposed cycle of watershed management activities.
2. Evaluate current use of staff, procedures, and technology to identify opportunities for improved efficiency, and develop and implement a plan to refine operations accordingly.
3. Obtain commitments at all levels necessary to consolidate and synchronize current water quality assessment reporting requirements.
4. Geographically prioritize the evaluation of unclassified waters and designated uses.
5. Develop and implement appropriate standard operating procedures, rules, or program guidance to clarify program responsibilities and support implementation of the activities associated with the watershed management approach.
6. Ensure the most efficient allocation of resources among water resource programs within the agency and for pass-through dollars outside of the agency.

Long-Term Objectives

1. Synchronize annual work plans of other TNRCC water resource programs, where appropriate, with the proposed cycle of watershed management activities.
2. Restructure the statewide triennial water quality standards review process to coincide with the targeted monitoring and assessment of the statewide watershed management schedule.
3. Develop a fiscal accounting mechanism to provide periodic accounting of fee dollars for each river basin.

Anticipated Benefits

1. Improved coordination and communication among TNRCC water resource programs.
2. Improved coordination in setting priorities and establishing common goals among TNRCC water resource programs.
3. Improved targeting of staff and funds to address highest-priority concerns.
4. Achieving more balanced work loads by clarifying responsibilities and synchronizing with the watershed management cycle.
5. Reduced paperwork through consolidation of reporting requirements.

Goal 6: Improve Public Participation in Water Resource Management

Elected officials and public agencies throughout Texas seek public support for their technical, policy, and budgetary decisions. Concurrently, there is a need for better communication between government agencies and stakeholders who live and work in each river basin. A consistent watershed management planning process provides opportunities for meaningful public participation in water resource management decisions.

Short-Term Objectives

1. Establish an ongoing process for relying on existing basin steering committees throughout the cycle of watershed management activities—from the identification of problems through the implementation of solutions—to set basin-specific goals, priorities, and recommendations for use in guiding TNRCC program decisions.
2. Broaden stakeholder representation and improve participation and communication in existing basin steering committees.

Long-Term Objectives

1. Establish a network to involve other TNRCC resource programs (such as groundwater, waste management, and pollution prevention) in decision making to address environmental quality issues in individual river basins.
2. Promote watershed management at the local level by improving opportunities for participation from local governments, private citizens, state and federal agencies, and the regulated community.

Anticipated Benefits

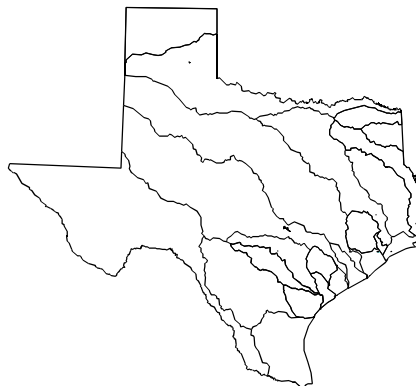
1. Improved communication between stakeholders and the TNRCC.
2. More support at the local level, because stakeholders are included throughout the watershed management process. This support leads to more cost-effective management strategies with wider public acceptance.
3. Increased public awareness of water quality issues and responsibilities of state and federal agencies.
4. Improved communication of local concerns, goals, and priorities to the TNRCC and other water resource managers.

Chapter 2

Core Components of the Watershed Management Approach

The initial watershed management approach for TNRCC operations was designed with five core components based on extensive OWRM planning and the foundation established by existing surface water quality programs and statutes:

- 💧 **Geographic units** (river basins and their watersheds) are the spatial basis for coordinating activities.
- 💧 **A basin management cycle** coordinates key watershed management activities over time.
- 💧 **A statewide basin management schedule** establishes a statewide calendar and sequence for conducting key watershed management activities in each river basin.
- 💧 **Total maximum daily loads** are now viewed as watershed action plans that identify responsible parties and specify actions needed to restore and protect water quality.
- 💧 **Stakeholder involvement** reflects a concerted effort by the TNRCC to involve stakeholders throughout the watershed management cycle to achieve greater understanding of water quality issues and support for implementing management strategies.



Details on each component and its relation to the overall framework are provided below.

Geographic Units

The TNRCC has historically used river basins and stream segments as the spatial basis for coordinating selected water quality management activities. River basins are the 23 recognized drainage areas for major rivers and coastal areas within the state. “Segment,” within the TNRCC, refers to surface waters within an approved planning area exhibiting common biological, chemical, hydrological, natural, and physical characteristics and processes. The state’s nine estuarine systems and the extraterritorial waters of the Gulf of Mexico are also identified as stream segments and thus are recognized as planning areas that must be managed (see Figure 2-1). The boundaries of the river basins are hydrologically defined, and because of their use in Texas water resource management, they provide an important precedent in support of a watershed management approach.

Stream segments were established under Texas’ water quality standards to facilitate

1. water planning activities;
2. issuing permits;
3. allocating construction grant funds for municipal facilities;
4. supporting other programs necessary for CWA implementation.

Figure 2-1. Geographic Units for the State of Texas

Texas consists of 15 major river basins, 8 coastal basins, 9 estuarine systems, and the extraterritorial waters of the Gulf of Mexico. This comprises approximately 191,228 miles of streams and rivers, and 624 coastline miles. All of these Texas streams drain into the Gulf of Mexico. Of the total stream mileage, 144,500 miles (75%) have intermittent flow during some part of the year, which means these streams have portions that are completely dry some of the time. Texas also has approximately 6,736 reservoirs with a surface area of 10 acres or larger, for a total coverage estimated at 4,065,600 acres.



While river basins and stream segments have been historically used in Texas as the geographic units for water resource planning and management, the TNRCC and other water resource management agencies have identified various limitations in the stream segment system:

1. The historical focus on stream segments has led to a perception of water quality that is restricted to the stream, its bed, and its banks. As a result, the land (or watershed) that drains into each segment is often not considered in water quality management.
2. As the stream segment network has been expanded over time, the delineation of individual segments has not been based on consistent criteria.
3. The spatial resolution of the existing stream segment network is not at a small enough scale to identify and address many water pollution sources.
4. The existing numbering system used for stream segments is inconsistent, and it does not specifically identify and number smaller, unclassified streams.

These limitations have led the TNRCC and other water resource management agencies to consider adopting a more consistent, hydrologically defined geographic unit (i.e., watershed). The readily identifiable boundaries of watersheds provide a functional geographic unit for coordinating management efforts. A common set of geographic units provides standardized means for locating, inventorying, exchanging, and assessing data relevant to basin hydrology and water quality issues. Units of different sizes (e.g., watersheds and river basins) allow for watershed-based activities at different scales. Throughout this document, watersheds are considered hydrologically based subdivisions of each river and coastal basin.

The largest units are the 23 historically recognized drainage areas for the major rivers and coastal basins within the state, the nine estuarine systems, and the extraterritorial waters of the Gulf of Mexico (see Figure 2-1). Key water quality activities such as monitoring, assessment, data management, permitting, and reporting will be coordinated at this large scale. These units are also the basis for CRP coordination. The TNRCC envisions continuing efforts through the CRP to subdivide all basins into smaller geographic units, or watersheds, to be used for more focused data collection, analysis, management strategy development, and implementation activities. Throughout Texas, water resource programs and stakeholders perform water quality planning and management activities at different scales. The use of a common set of defined watersheds within each river basin could greatly enhance opportunities for coordinating, collecting, and sharing water quality data among all stakeholders. This coordination can be enhanced by using geographic information system (GIS) technology, which can scale up or down while maintaining continuity of information. Methods and criteria are currently being developed through a cooperative effort involving the TNRCC, CRP contractors, and the U.S. Geological Survey for defining a compatible set of watersheds for each river basin, as well as procedures for delineating, digitizing, and numbering them.

Basin Management Cycle

Just as the state's river basins and watersheds provide geographic focus for coordination, the basin management cycle provides the focus for scheduling activities and coordinating resources within each watershed. The cycle combines three features into an orderly system for continuously focusing water quality management activities through:

- 💧 A phased series of five major watershed management planning and implementation activities (see Figure 2-2),
- 💧 Deadlines for each of the activities necessary to achieve a complete iteration of the basin management cycle every five years (see Figure 2-3),

- 💧 A sequence and schedule for conducting these activities in all major river basins (see Figure 2-4).

The basin management cycle establishes a rational process for developing and implementing TMDLs, which are now viewed as action plans that specify activities needed to restore and protect water quality standards of individual water bodies.

Phases of the Basin Management Cycle

The basin management cycle has five sequenced activity phases that are repeated for each basin at fixed five-year intervals to ensure that management goals, priorities, and implementation strategies are routinely updated and progressively implemented (see Figure 2-2). Planning and implementation are not one-time activities. The repeating management cycle reflects the TNRCC's understanding that the nature of watershed management is dynamic, and a framework must be flexible enough to address this dynamic nature in an orderly manner over time.

Phase 1: Scoping and Re-evaluation

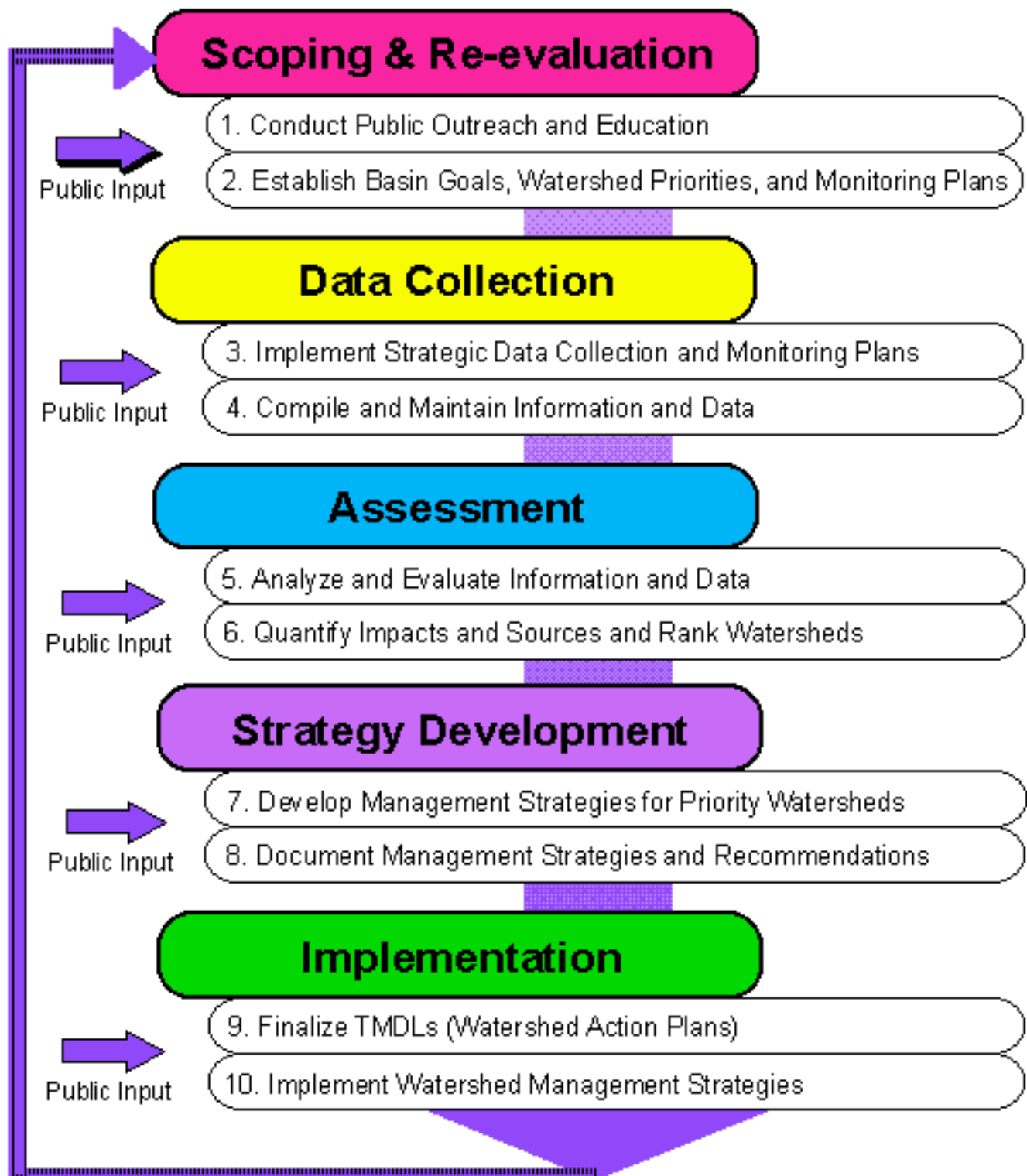
This phase involves three basic activities: conducting public outreach, identifying priority watershed issues, and planning for coordinated data collection. Public outreach entails communicating with the public to raise awareness of the watershed management process (including the schedule) and building trust through increased opportunities for meaningful input and participation throughout the cycle of activities. To identify issues, interested parties rely on existing assessment reports [CWA §305(b) report, §303(d) list, and CRP assessment reports] to collectively identify local concerns, priority watersheds, and basinwide goals and objectives. The next step is to prepare strategic monitoring plans for coordinated compilation of existing data and collection of additional watershed-specific monitoring data related to priority issues. In subsequent iterations of the cycle, planning may involve re-evaluating previously identified issues and goals to determine their current relevance in light of new information.

Phase 2: Data Collection

Watershed-based data (e.g., chemical, physical, biological, hydrologic, hydraulic, and land use data) are collected by responsible parties (e.g., private, local, regional, state, and federal organizations) during this phase. Efforts are guided by quality assurance project plans (QAPP). Monitoring plans incorporate three major aspects:

1. *Baseline monitoring* is conducted on every important water body in each basin. This is the traditional monitoring performed continually at key sites on high-profile water bodies regardless of the basin cycle. Data are collected using a monitoring network to adequately characterize water quality trends and monitor progress in protecting or restoring water quality. Monitoring at these important sites may be conducted by the TNRCC or other organizations. The monitoring design will depend on the actual use of the water body and on potential sources of contamination.
2. *Status monitoring* is also conducted on every important water body in each basin. An intense two-year period of status monitoring commences in Phase 1 of the five-year basin management cycle and ends at the beginning of Year 3. In particular, this is the effort necessary to collect data on undesignated water bodies as well as more extensive status and trend analyses of those classified segments not on the 303(d) list. These data are critical for determining compliance with water quality standards and will be primarily used to revise interim updates of the CWA §305(b) Water Quality Inventory Report.
3. *Targeted monitoring* commences at the beginning of Phase 2 of the five-year basin management cycle and ends at the beginning of Year 4. Targeted monitoring focuses on those water bodies identified on the CWA §303(d) list. This monitoring will establish the geographic extent and degree of water quality impairment necessary to apply models for establishing TMDLs, to determine sources of contamination to revise water quality standard, and to support specific wastewater permit limits.

Figure 2-2. Phases of the Basin Management Cycle



Phase 3: Assessment and Targeting

During this phase, quantitative and qualitative analyses of baseline and targeted watershed data are performed by developing and applying tools such as GIS, statistical analysis methods, contaminant fate and transport models, and forecasting models. Information gathered during Phases 1 and 2 for priority watersheds is analyzed to determine appropriateness of water quality standards and to establish load allocations for point and nonpoint sources of pollution. Additional issues identified during assessment are the basis for subsequent assessment reports and revisions to the CWA & 303(d) List.

Phase 4: Strategy Development

In this phase, the TNRCC and technical experts from partner agencies work with other stakeholders to identify, evaluate, and select management strategies that will be effective at achieving pollutant reduction goals for priority watersheds. Focusing on the priority watersheds identified in Phase 1, stakeholders will develop strategies that target actions and financial resources when and where they will have the greatest environmental benefit. Sound science and stakeholder consensus are emphasized to establish cost-effective solutions that are strongly supported by those who must take the actions. Priorities and implementation strategies are documented in draft watershed action plans that outline specific methods and funding sources to serve as a guide for TNRCC programs and partners. Draft action plans are communicated to a broader public audience and fine-tuned as necessary to strengthen public support.

Phase 5: Implementation

During this phase, the TNRCC and other stakeholders carry out management actions in accordance with agreed-upon action plans. For example, TNRCC actions include reclassifying uses for misclassified streams, classifying unclassified streams, revising stream standards (as appropriate), awarding nonpoint source project grants, implementing wastewater pretreatment programs, and issuing wastewater permits. Upon completion of the implementation phase in any given basin, the cycle will begin again with Phase 1 to continue the iterative planning process.

Timing within the Cycle

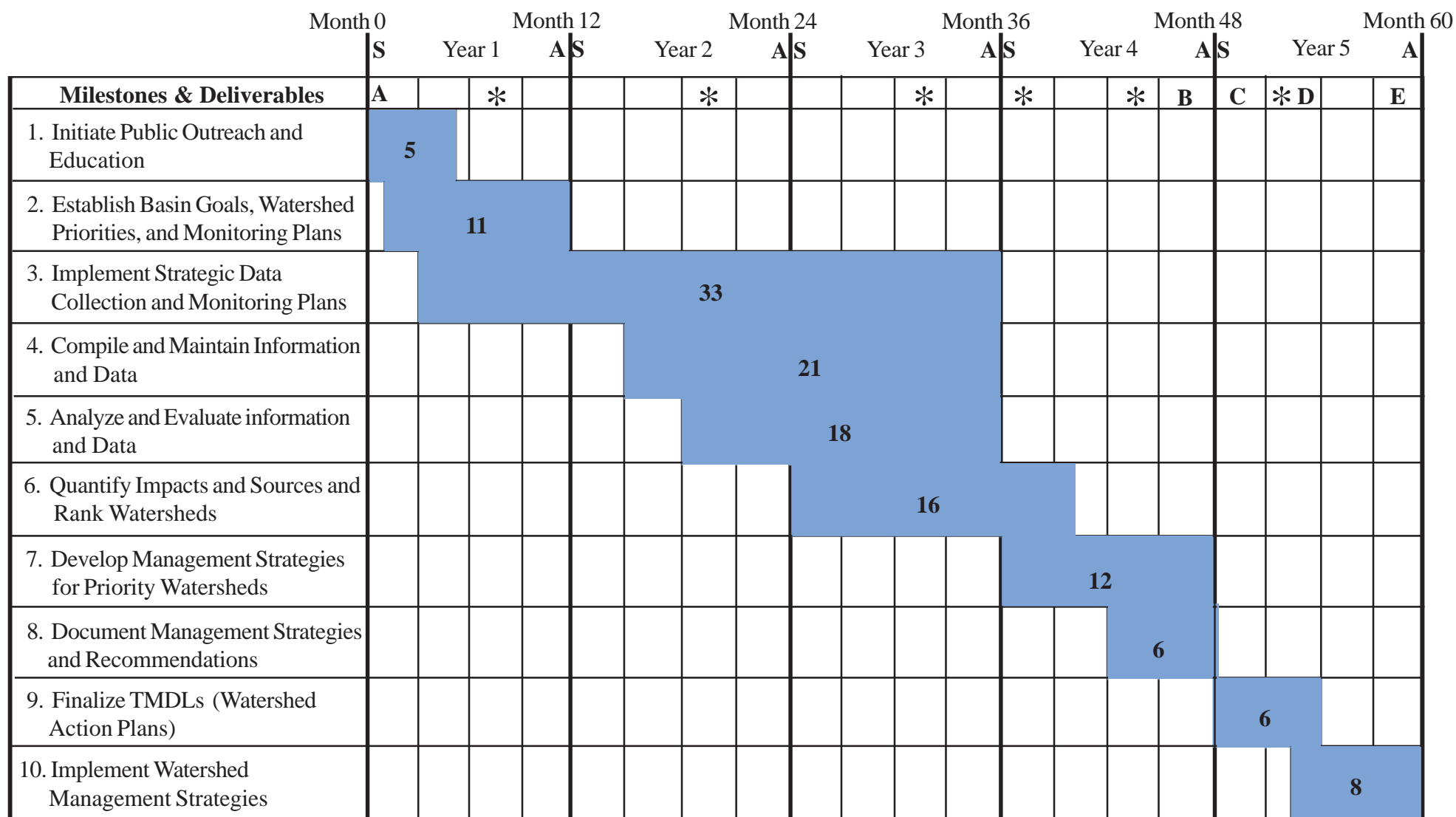
The basin management cycle is comprised of 10 steps organized within the five phases. The phases are the basic tenets of any major planning effort, and they provide a logical framework for coordinating water quality programs.

Figure 2-3 is a time line showing the number of months allocated for each major step in the management cycle of a single basin. The cycle of activities is based on the state's fiscal year, which begins on September 1 (S) and ends on August 31 (A). Public meetings, tasks, and major deliverables are scheduled to ensure that the OWRM and CRP contractors synchronize programs, resources, and outputs with the basin management cycle of individual river basins.

Recommended Time Frames for Input from Key Stakeholders

The basin management cycle will ensure stakeholder participation at critical junctures in the planning process. In the first year of the cycle, public meetings are necessary to establish basin goals, monitoring objectives, and TMDL priorities, and to recruit stakeholders from priority watersheds to participate in the process. In Year 2, the cycle will incorporate public meetings to inform and obtain input from local stakeholders who have been recruited to assist in identifying management strategies for priority watersheds. Once the monitoring and assessment phases are complete, additional public meetings will be held in Year 3 to inform stakeholders in the basin and in priority watersheds of the OWRM's findings. In Year 4, public meetings will be held in priority watersheds to provide stakeholders with the opportunity to play a role in adopting TMDLs and other management strategies for priority watersheds. At the end of the basin management cycle, during the implementation phase, meetings will be held to inform as many interested parties as possible about the watershed management strategies to be implemented and stakeholder roles in implementing them.

Figure 2-3. Time Line for the Basin Management Cycle



Note: Numbers in each block denote approximate number of months allocated for each task.

Key Milestones & Major Deliverables:

- * Basin steering committee meeting to inform and obtain input/recommendations from key stakeholders.
- A Statewide Strategic Monitoring Plan - Status and targeted monitoring efforts
- B Interim State of Texas Water Quality Inventory Report Update - CWA §305(b) report and CWA §303(d) List
- C Interim Nonpoint Source Pollution Statewide Management Plan Report Update - CWA §319
- D TMDLs (Watershed Action Plans) for priority watersheds
- E Issue domestic and industrial permits

Tasks

Ten major tasks are identified in the five-year cycle, from public outreach to implementation (see Figure 2-3). These water quality management activities will become routine functions in the OWRM over time. The watershed management cycle is an opportunity to coordinate public outreach, surface water quality monitoring, modeling, assessment, standard setting, nonpoint source management projects, and permit activities of each basin in the OWRM, while ensuring stakeholder representation in the process.

Deliverables

Major program outputs are synchronized with appropriate steps in the basin management cycle. Five deliverables are mandated by the CWA: the Nonpoint Source Pollution Statewide Assessment and Management Plan Reports (§319), the State of Texas Water Quality Inventory Reports [§305(b) and §303(d)], and the issuance or renewal of domestic and industrial permits. The TNRCC will work with the EPA to coordinate the due date of these deliverables with the planning cycle. Two other deliverables, the Strategic Monitoring Plan and the Watershed Action Plan, are essential steps in the basin management cycle.

Statewide Basin Management Schedule

The statewide basin management schedule illustrated in Figure 2-4 is designed to accomplish all five phases of watershed management in every basin in Texas, while balancing annual workloads of TNRCC programs and other partners operating statewide. The state's 23 basins, along with its estuaries and extraterritorial waters of the Gulf of Mexico, are assembled into five geographic groups (see Figure 2-5):

- 💧 *Group A:* Canadian River; Cypress Creek; Neches River; Red River; Sabine River; Sabine Pass; Sulphur River; and part of the Trinity River (0824–0841)
- 💧 *Group B:* Part of the San Jacinto River (1007, 1010–1014, 1017); Trinity River (continued, 0800–0823)
- 💧 *Group C:* San Jacinto River (continued, 1000–1006, 1008, 1009, 1015, 1016); Neches-Trinity Coastal; Sabine Lake; East Bay; Trinity Bay; San Jacinto–Brazos Coastal; Trinity–San Jacinto Coastal; Tabbs Bay; Black Duck Bay; Scott Bay; Burnett Bay
- 💧 *Group D:* Upper Galveston Bay; West Bay; Clear Lake; San Jacinto Bay; Moses Bay; Chocolate Bay; Bastrop Bay; Christmas Bay; Drum Bay; Barbours Cut; Texas City Ship Channel; Bayport Channel; Lower Galveston Bay; Brazos River; Brazos–Colorado Coastal; part of the Colorado River (1417–1433); Lavaca River; East Matagorda Bay; Cedar Lakes
- 💧 *Group E:* Colorado River (continued, 1400–1416); Colorado–Lavaca Coastal; Matagorda Bay; Tres Palacios Bay; Lavaca–Guadalupe Coastal; Guadalupe River; Lavaca Bay; Cox Bay; Keller Bay; Carancahua Bay; San Antonio River; San Antonio–Nueces Coastal; Espiritu Santo Bay; San Antonio Bay; Mesquite Bay; Aransas Bay; Copano Bay; St. Charles Bay; Corpus Christi Bay; Nueces Bay; Redfish Bay; Nueces River; Nueces–Rio Grande Coastal; Corpus Christi Inner Harbor; Oso Bay; Laguna Madre; Baffin Bay; South Bay; Brownsville Ship Channel; Rio Grande; Gulf of Mexico

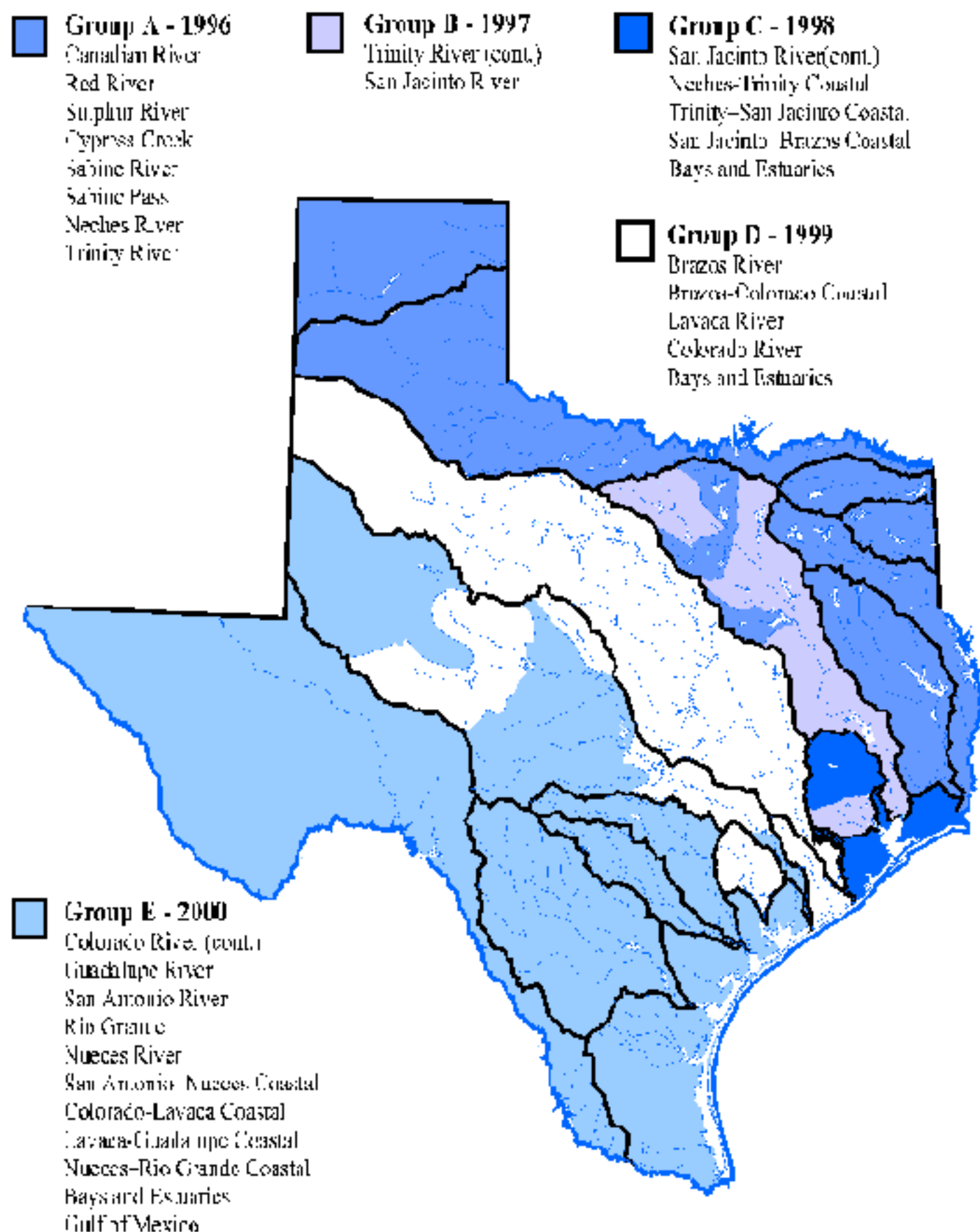
Complete transition to the statewide watershed management cycle will take approximately nine years. Beginning in 1997 with Basin Group A, the TNRCC will phase in the management cycle. Each year, the cycle will be phased in for the next basin group, until all five basin groups have been initiated in 2002. Activities in all five basin groups will continue sequentially in the same order, repeating the cycle every five years.

Figure 2-4. Statewide Basin Management Schedule

River Basins*	Year 1	Year 2	Year 3	Year 4	Year 5
GROUP A: Canadian River, Red River, Sulphur River, Cypress Creek, Sabine River, Sabine Pass, Neches River & Trinity River	SCOPING	DATA COLLECTION	ASSESSMENT & TARGETING	STRATEGY DEVELOPMENT	IMPLEMENTATION
GROUP B: Trinity River (continued), San Jacinto River	IMPLEMENTATION	SCOPING	DATA COLLECTION	ASSESSMENT & TARGETING	STRATEGY DEVELOPMENT
GROUP C: San Jacinto River (cont.), San Jacinto–Brazos Coastal, Neches–Trinity Coastal, Trinity–San Jacinto Coastal, Bays & Estuaries	STRATEGY DEVELOPMENT	IMPLEMENTATION	SCOPING	DATA COLLECTION	ASSESSMENT & TARGETING
GROUP D: Brazos River, Brazos–Colorado Coastal, Lavaca River, Colorado River, Bays & Estuaries	ASSESSMENT & TARGETING	STRATEGY DEVELOPMENT	IMPLEMENTATION	SCOPING	DATA COLLECTION
GROUP E: Colorado (cont.), Guadalupe, San Antonio, Nueces & Rio Grande Rivers, San Antonio–Nueces Coastal, Colorado–Lavaca Coastal, Lavaca–Guadalupe Coastal, Nueces–Rio Grande Coastal, Bays & Estuaries, Gulf of Mexico	DATA COLLECTION	ASSESSMENT & TARGETING	STRATEGY DEVELOPMENT	IMPLEMENTATION	SCOPING

*Note: Chronological order of river basins is derived from the Title 30 Texas Administrative Code § 305.71 Permit-by-Basin rule. Waste-water permits for each group of basins are issued to coincide with the implementation phase.

Figure 2-5. TNRCC Permit-by-Easir Approach to Wastewater Permitting



The statewide basin schedule provides TNRCC programs, partners, and other stakeholders with a basis for long-term work planning. All parties at the local, regional, state, and federal level know well in advance when certain activities will occur and can plan accordingly. Therefore, programs will spend less time trying to synchronize schedules on an ad hoc basis each year.

Although some flexibility in meeting schedules may be allowed under certain circumstances, programs need to stay on the statewide basin schedule to maintain the continuity and integrity of the framework. The TNRCC recognizes that circumstances differ in each basin in a given year—for example, weather patterns may delay planned strategic monitoring, complexity may delay development of management strategies for certain issues, or wastewater permits may need to be issued at specified times. If circumstances occur that prevent the collection of all recommended information, the available data will be used to formulate the most complete management strategies possible. Activities not completed and priorities not addressed in one iteration of the cycle can be addressed in the next five-year cycle.

Stakeholder Involvement

The TNRCC is neither entirely nor exclusively responsible for managing water resources or cleaning up the environment; rather, the protection and restoration of water resources and aquatic habitat depend on the collective efforts of citizens, businesses, and governmental agencies. The watershed management approach enables citizens and businesses to collaborate and participate with government by coordinating programs and services that lead to the desired environmental results, and the watershed management approach establishes a more consistent process for coordination between the TNRCC and stakeholders. One of the TNRCC's guiding principles is ensuring meaningful public participation in the agency's decision-making process.

A stakeholder is defined as any entity involved in or affected by watershed management activities within a watershed, including the general public and the regulated community. The term *stakeholder* covers a broad range of people and organizations, and it includes four general categories:

- 💧 *Government:* City, county, regional, state, federal, and international governmental agencies
- 💧 *Business:* Commercial and industrial firms, utilities, business groups, and trade associations
- 💧 *Agriculture:* Corporate and individual farmers and ranchers
- 💧 *Public:* Individual citizens, schools and universities, and activist groups (including citizen, environmental, consumer, and community groups)

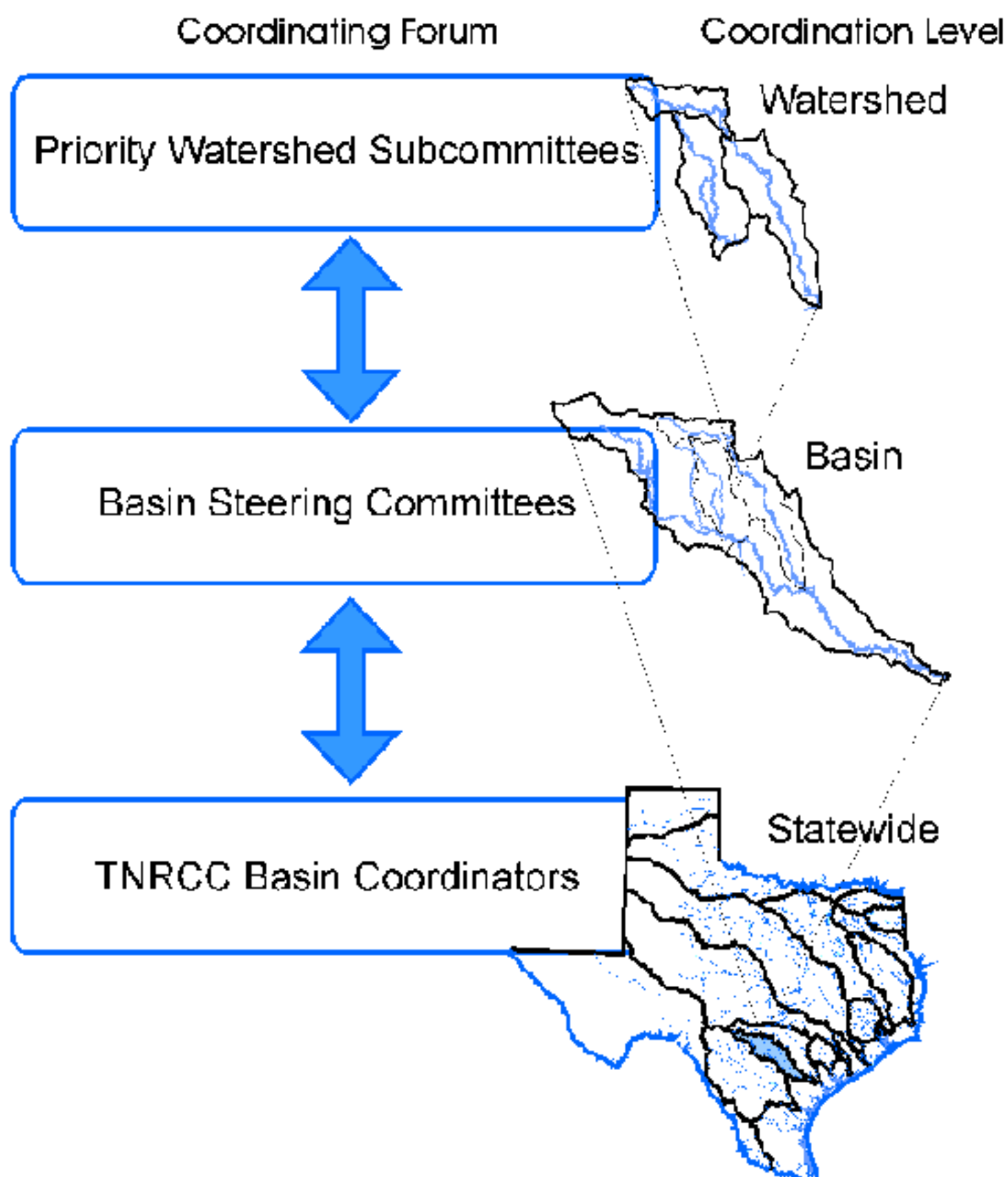
For a representative list of stakeholders, see Appendix A.

The watershed management approach provides additional opportunities for stakeholders to become more aware of water-related issues and participate meaningfully in all phases of the basin management cycle. Outreach and participation increase communication between the TNRCC and watershed stakeholders, often leading to greater trust and interest among parties that are addressing water resource issues. Through partnerships with stakeholders, the TNRCC strives to improve the means to establish goals, identify problems, and implement cost-effective solutions.

Coordination of stakeholders is needed at three levels:

- 💧 *Statewide* for agencies and organizations that conduct watershed-management-related activities across the entire state, and therefore need a statewide structure for targeting and synchronizing efforts with one another.

Figure 2-6. Primary Forums for Stakeholder Coordination



- 💧 *Basinwide* for assessing water quality conditions within a basin and establishing basin-specific management goals and priorities.
- 💧 *Within local watersheds* to rally public support and participation of stakeholders to establish watershed-specific action plans that incorporate nonregulatory and regulatory mechanisms to protect or restore water quality.

The framework includes three separate, but related, coordinating forums to meet these needs (see Figure 2-6). TNRCC basin coordinators will support statewide coordination needs, acting as a point of contact for stakeholders regarding information on the approach and basin management activity schedules, and for compiling key pieces of information for TNRCC basin management documents. Basin steering committees, currently required under the Clean Rivers Program and administered by CRP contractors, provide the primary forum for coordinating stakeholder involvement at the basin level. Priority watershed subcommittees, comprised of key stakeholders from priority watersheds, will provide valuable input about local conditions necessary to design and implement site-specific watershed management strategies. These subcommittees will not be active in all watersheds at the same time because of administrative constraints. Rather, a limited number of subcommittees will be formed during each iteration of the management cycle to focus coordination efforts on priorities identified by the basin steering committee and the TNRCC. The development and functions of these coordinating forums are addressed in greater detail in Chapter 4.

In addition to the primary forums for coordinating stakeholders described above, the TNRCC will continue to use other complementary means of involving and informing stakeholders, including:

- 💧 *Texas Watch:* A network of trained volunteers and supportive partners work together in the Texas Watch Program to help the TNRCC protect Texas' natural resources. Texas Watch provides two principal services: providing accurate, useful information to support environmental management decisions, and promoting effective communication with the public about environmental issues. The program supports a wide range of monitoring activities, including a certified water quality monitoring program, educational programs, and nonpoint source pollution projects. Working closely with local citizens, Texas Watch forms watershed-based partnership networks to help volunteers locate resources to perform their monitoring activities. Public and private entities provide funds to help train, equip, manage, and support the growing number of volunteer monitors across the state. Texas Watch has created strong ties between citizens, industries, river authorities, councils of government, water districts, cities, local, state, and federal agencies, students at all grade levels, universities, and private foundations.
- 💧 *Public Hearings, Meetings, and Workshops:* The TNRCC conducts public hearings as necessary to evaluate a permit application or an enforcement proceeding. For instance, an individual must apply for TNRCC approval for the use of state water; discharge of wastewater; storage, processing, or disposal of hazardous waste or industrial solid waste; operation of a privately owned and operated public water or sewer utility; and emission of contaminants or odors into the air. If there is a dispute between an applicant and the agency regarding a permit or order, or if one or more persons with legal standing object to the activity under consideration, a public hearing may be held. This is an important formal mechanism for public participation associated with water quality management issues for any watershed within the state. Public meetings are a less formal setting in which the goal is to gather public input on current commission activities such as rule making or permitting. In addition, the TNRCC annually hosts a number of workshops on water resource topics, which provide additional opportunities for public participation and input into the programs, procedures, and management objectives of the TNRCC.

Total Maximum Daily Loads (Watershed Action Plans)

Texas has several methods for providing detailed information about the status of water quality around the state, including the *State of Texas Water Quality Inventory Report*, nonpoint source assessment report, the CRP basin assessment reports, and electronic databases. Although these outputs provide important, scientifically based information, they do not provide solutions to specific water quality issues. Most water quality programs have historically focused on monitoring and

assessment, and marginal emphasis has been placed on documenting consensus-based management strategies for individual watersheds.

The current trend toward a comprehensive interpretation of TMDL requirements under CWA §§303 (d) and (e) is forcing local, regional, state, federal, and international water resource management agencies to consider a much broader approach to point and nonpoint source pollution controls. A total maximum daily load is no longer merely a load allocation number obtained through a water quality modeling exercise. Instead, a TMDL is a process that should culminate in a written, quantitative assessment of water quality problems and contributing sources, and an implementation plan identifying responsible parties and specifying actions needed to restore and protect water quality standards.

In a priority watershed, the TMDL provides a pollutant allocation mechanism that is useful in coordinating local, regional, state, federal, and international actions to restore water quality. Allocations for point source pollutants can be incorporated as pollution limits in enforceable discharge permits. Allocations for nonpoint source pollutants are targets to be met through cooperative agreements and incentives. In outlining appropriate management strategies and objectives, establishing implementation schedules, and identifying potential sources of funding, the TMDL provides critical direction for watershed management at the local and regional levels.

As more emphasis is placed on developing and implementing TMDLs, there will be a growing need to document stakeholder agreements such as pollution reduction goals, pollutant load allocations, management solutions, funding options, and implementation schedules. To meet this need, a general format has been established for documenting TMDLs (or watershed action plans), which will become an output of Phases 4 and 5 of the watershed management approach.

TMDLs will provide critical direction for watershed management at local and regional levels. The purpose of a TMDL is to provide a consistent reference document that presents specific management strategies and corresponding roles for those responsible for implementing water quality restoration and protection measures. TMDLs document sources of water resource impairment, pollutant load allocations, appropriate management strategies and objectives, implementation schedules, and potential funding sources for the management strategies. The level of effort and the extent of documentation necessary for developing a TMDL will vary from watershed to watershed. The primary factors affecting the development of TMDLs include watershed size, model complexity, number and complexity of pollutants, distribution and quantity of point and nonpoint sources, and extent of public participation.

Figure 2-7 outlines key components envisioned for a typical watershed action plan, which will be updated on a five-year rotating schedule for each group of basins. The TNRCC will work closely with the EPA to determine how plans for total maximum daily loads could be used to meet multiple reporting requirements.

While the TNRCC's water resource programs will rely on the watershed action plans when coordinating water quality permitting, monitoring, and assessment activities within the watershed, the document is intended to reach as wide an audience as possible. Thus, another purpose of the plans is to increase general awareness of watershed management among members of the regulated community and the public. A list of expected audiences for watershed action plans is provided below, along with a description of the purposes that a watershed action plan will serve for that audience.

Figure 2-7. Recommended Contents of a Typical Watershed Action Plan

- 💧 Watershed name(s), segment number(s), and location(s)
- 💧 List of participants involved in the development of the watershed action plan
- 💧 General description and geographic display of the priority watershed issues
- 💧 Designated use—not supported, partially supported
- 💧 Source of impairment—quantify and characterize relative contributions of point and nonpoint source pollution
- 💧 Description of existing management activities within the watershed
- 💧 Summary of modeling/analysis—recommendations for point and nonpoint source loading reduction goals
- 💧 Proposed actions and schedules for implementation:
 - ◆ Rationale and detailed information on proposed management solutions (CWA §319 Nonpoint Source Work Plans, Issue Permits), including analysis of alternatives
 - ◆ Recommendations for future monitoring (e.g., to clarify causes and sources of impacts and measure effectiveness)
 - ◆ Schedule for implementation of regulatory and nonregulatory solutions
 - ◆ Specific roles for responsible parties
 - ◆ Description of viable funding mechanisms

Audience and Purpose of Watershed Action Plans

TNRCC

Watershed action plans will result in improved program coordination among the TNRCC's water quality management programs, including Water Quality Modeling, Nonpoint Source Program, Surface Water Quality Standards, Toxicity Evaluation, the CRP, and the basin coordinators. The most significant outcome of Phase 4, Strategy Development, will be the establishment of point and nonpoint source reduction goals, where appropriate, for priority watersheds. These reduction goals will be the basis for developing management strategies to address known water quality impacts. The plans will detail the implementation responsibilities under the authority of the TNRCC, such as wastewater permits, best management practices for urban nonpoint source pollution, supplemental environmental projects, and revisions to water quality standards. The plans will indicate watersheds that need to be targeted for specific monitoring during the next iteration of the basin management cycle. In addition, they will improve communication and information access and transfer with other TNRCC program areas in the Office of Water Resource Management, the Office of Waste Management, and Pollution Prevention and Recycling.

U.S. Environmental Protection Agency (EPA)

The TNRCC considers the watershed management approach as a rational method for developing total maximum daily loads for priority water bodies as required by the CWA. Consequently, the EPA will be involved in the review of these action plans for their compliance with the CWA. Since TMDLs will aim to incorporate wastewater permit effluent limits, recommendations for new EPA pretreatment programs, CWA §319 work plans, and recommendations for water quality standards, the EPA will rely on these documents to track the TNRCC's progress in meeting various requirements under the CWA.

Clean Rivers Program Contractors

As the Clean Rivers Program exists today, CRP contractors could play an important role in the development and documentation of the watershed action plans. Through coordination with agency staff, CRP contractors will assist in documenting sources of water resource impairment and basin development trends; recommending management alternatives

and objectives; and identifying potential funding sources for management strategies. They will also assist in coordinating input and information from stakeholders which supports strategy development. By focusing on priority issues within priority watersheds, river basin authorities will have an important document for use in developing their long-term plans for allocating financial and staff resources.

Other Federal and State Agencies

Watershed action plans will become a useful method for communicating with other federal and state agencies with responsibilities in water resource management. The plans will inform federal and state agencies about the basin management cycle, which in turn will help the agencies coordinate the regulatory and nonregulatory activities under their authority to support TMDLs and other management activities proposed within priority watersheds.

Local and County Governments

Local and county governments have numerous planning and resource management authorities and responsibilities regarding the use of land and water resources within a watershed. Through Phase 4, Strategy Development, management strategies at the local level may be appropriate. Where statutory authority exists, zoning, subdivision, or water quality protection ordinances may be identified as the most appropriate method for addressing the issues identified in priority watersheds. Wastewater pretreatment programs, pollution prevention, public education and outreach, and training courses are other management strategies that could be incorporated into the watershed action plans.

Legislature

Watershed action plans will provide a consistent method for communicating technical information and administrative needs to the state legislature. In addition to heightening the legislature's awareness of watershed management issues, the plans will help identify environmental problems within individual legislative districts in need of additional appropriations or additional statutory authority to design and enforce solutions.

Regulated Community

Watershed action plans will help educate the regulated community regarding management actions needed to maintain or restore the ecological integrity of the watershed, including reasons for point source effluent limitations and nonpoint source runoff controls. Priority concerns, implementation schedules, and assimilative capacity information contained in plans will provide direction and a basis for making longer-range commitments to environmental protection efforts and encourage voluntary measures for pollution control and compliance. The success of the management strategies proposed in TMDLs will be enhanced by the involvement of regulated entities in priority watersheds.

General Public

Watershed action plans improve public awareness of local water quality issues. This increased awareness helps government agencies garner public support for water quality programs and improves public confidence that resources are being directed to priority environmental issues within their communities. The information in the plans should facilitate stakeholder participation in watershed management and help direct volunteer efforts, such as citizen monitoring and river cleanups, toward useful projects.

Special Interest Groups

Examples of special interest groups include, among others, power utilities, agricultural industries and farmers, and environmental groups. Watershed action plans should raise general awareness of watershed priorities among interest groups, improve perception of environmental management, facilitate participation, and help focus special water quality management efforts put forth by these groups.

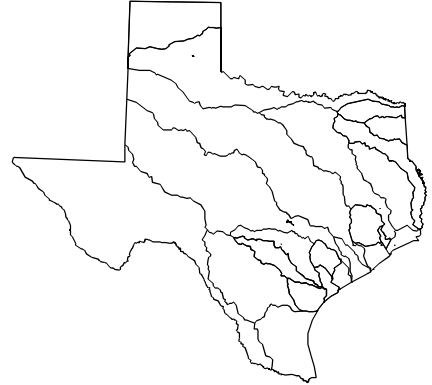
Research Institutions

Watershed action plans will eventually include recommendations for additional research and modeling needs that could be met through future cooperative efforts with universities, national laboratories, land grant colleges, and other research institutions. Consequently, research institutions can use the watershed management approach to target their research and technical assistance efforts.

Chapter 3

Existing TNRCC Building Blocks for Watershed Management

Successful implementation of Texas' statewide watershed management approach will depend on the expertise, outputs, and resources of stakeholders. Existing surface water quality programs under the Office of Water Resource Management (OWRM) and the Field Operations Division are the foundation for core components of the watershed management approach, and the programs will adjust workloads to support implementation. A subset of OWRM and Field Operations programs will initiate the framework for implementation. Key programmatic and regulatory building blocks that are considered critical to the overall success of the approach are listed below, along with descriptions of how they relate to watershed management. This list is by no means exhaustive. Managers and staff throughout the TNRCC are encouraged to continue incorporating additional agency and external partner activities whenever and wherever it is sensible and cost-effective.



OWRM Programs Supporting Watershed Management

The primary building blocks for the watershed management approach are provided by existing OWRM program functions and capabilities. Most planning, monitoring, assessment, and implementation activities of the proposed approach are already being conducted. The watershed management approach simply provides a new framework that streamlines these activities, focuses them more intensely on achieving resource management objectives, and facilitates integrating program functions. Key functions and capabilities of existing OWRM organizational units that will form the foundation for the watershed management approach are summarized below.

Surface Water Quality Monitoring Team

- 💧 Collect statewide surface water quality data to support watershed assessment through ambient and targeted monitoring
- 💧 Coordinate and collaborate with TNRCC regional offices, the CRP, and other organizations to establish a watershed-based strategic monitoring plan in each river basin
- 💧 Manage water quality data and update the Water Quality Inventory Report [CWA §305(b)], which describes the status and trends of the state's waters
- 💧 Annually update the QAPP, which documents adherence to proven scientific practices to ensure that water quality data are scientifically credible
- 💧 Establish protocols and procedures for conducting nonpoint source data collection at the watershed level

Water Quality Modeling Team

- 💧 Review and recommend water-quality-based effluent limits based on wasteload evaluations for state wastewater permits
- 💧 Compile the CWA §303(d) list for Texas, which ranks water quality segments prioritized for remedial or protective actions
- 💧 Assess and project the effects of waste loading on instream dissolved oxygen concentrations

- 💧 Develop pilot project to establish protocols for modeling nonpoint source loadings at the watershed scale

Water Quality Standards Team

- 💧 Systematically develop and adopt surface water quality standards based on a triennial review process
- 💧 Conduct special studies and use attainability analyses to support the adoption of site-specific water quality standards
- 💧 Evaluate wastewater permits to ensure that water quality standards are achieved

Toxicity Evaluation Team

- 💧 Collaborate with the permitting, standards, and modeling teams to ensure appropriate limits and criteria for biomonitoring, toxic pollutants, flows, and mixing conditions for wastewater permits
- 💧 Locate and map all permitted wastewater discharges

Texas Watch Team

- 💧 Provide watershed-based environmental outreach and education efforts through volunteer monitoring networks
- 💧 Recruit and track volunteers to identify and monitor water quality issues and concerns

Ecosystem Research and Assessment Team

- 💧 Provide hydrological modeling and estimates of high- and low-flow conditions
- 💧 Conduct field sampling for biological integrity, including habitat analysis and biotic community analyses

Nonpoint Source Program Team

- 💧 Prepare the *Nonpoint Source Assessment Report for the State of Texas*, which identifies impacts from nonpoint sources of pollution, and the *Nonpoint Source Management Program for the State of Texas*, which identifies management strategies to address them
- 💧 Administer CWA §319 Nonpoint Source Grant Program, providing federal grant assistance for the implementation of NPS prevention and control projects
- 💧 Conduct public outreach and education activities that enhance public awareness of and involvement in nonpoint source pollution issues
- 💧 Provide technical assistance on the prevention and control of nonpoint source pollution.

Clean Rivers Program Team

- 💧 Provide oversight and coordination of the CRP, which provides the foundation for Phases 1 through 3 of the watershed management cycle
- 💧 Prepare guidance for CRP contractors participating in the watershed management approach
- 💧 Review and approve of basin monitoring plans, quality assurance project plans, and annual revisions from partners responsible for implementing basin monitoring plans

- 💧 Collaborate with basin steering committees and fee payers to ensure public input into TNRCC regulatory process
- 💧 Collaborate with OWRM surface water quality programs

Border Environmental Assessment Team

- 💧 Conduct pilot projects to establish protocols for modeling nonpoint source loadings at the watershed scale
- 💧 Conduct water quality monitoring and assessment in the Rio Grande and the Nueces–Rio Grande coastal river basins
- 💧 Provide continuous oversight of the basin steering committees of the Rio Grande and the Nueces and Rio Grande coastal river basins

Wastewater Permit Section

- 💧 Review and process wastewater permit applications for industrial and municipal point source wastewater discharges
- 💧 Coordinate with modeling, standards, and toxicity evaluation teams to ensure permits are written with appropriate effluent limitations and conditions for protecting water quality
- 💧 Participate in public hearings, meetings, and mediate as needed during the permitting process

TNRCC Regional Office Support of Watershed Management

- 💧 Conduct routine water quality sampling using recognized quality assurance procedures to determine ambient water quality
- 💧 Submit surface water quality monitoring data to central water quality database
- 💧 Conduct special studies to support water quality assessment
- 💧 Conduct compliance inspections of wastewater treatment facilities
- 💧 Initiate appropriate enforcement action to resolve noncompliance problems
- 💧 Conduct follow-up action to assess implementation of corrective measures
- 💧 Provide documentation, technical support, and quality control for formal enforcement actions

The building blocks within the OWRM and the TNRCC regional offices provide a strong foundation for Texas' watershed management approach. Many additional opportunities for program coordination and integration will arise as the watershed management approach evolves and as institutional awareness and support grows.

Permit-by-Basin Rule

The Permit-by-Basin Rule (Title 30, Texas Administrative Code, §305.71), adopted by the TNRCC on January 3, 1995, is an important element of the watershed management approach. This rule requires comprehensive evaluation of the combined effects of multiple permitted discharges on water quality within each watershed or basin. To the greatest practicable extent, the TNRCC requires that all industrial and domestic wastewater permits within a single river basin

or watershed have the same expiration date. This rule applies to all permit applications—new, amended, and renewed—received on or after the effective date of the rule. The rule allows the TNRCC to balance its permit workload annually over a five-year period, and brings greater consistency to the permitting process.

The rule reflects the hydrologic connection between major river basins and coastal basins. Permits will be issued to coincide with the implementation phase of the five-year watershed management schedule. The TNRCC may, if necessary, issue a permit for less than five years, but never for less than two years. Recognizing the need for flexibility during transition to the five-year cycle, permit schedules will be changed to reduce the burden on permittees. Permit expiration dates may be changed to accommodate the three-year compliance period, or variances, before water-quality-based limits become effective (see Table 3-1).

The Permit-by-Basin Rule, in conjunction with the watershed management cycle, establishes the statewide sequence for implementing a watershed management approach in all 23 basins and coastal waters of the state. The sequence of scoping, data collection, and assessment activities in each basin prior to permitting provides an efficient means to gain understanding of overall water quality in a watershed. Long-term environmental benefits of this rule will be even greater as water resource managers gain an understanding of the cumulative effects of discharges on watersheds.

Table 3-1. Renewal Schedule of Wastewater Discharge Permits by River Basin

River Basin	Basin Group	Basin No.	Segments	Approximate No. of State Permits				
				1996	1997	1998	1999	2000
Canadian River	A	01	0100–0105	44				
Red River	A	02	0200–0229	125				
Sulphur River	A	03	0300–0306	32				
Cypress Creek	A	04	0400–0409	48				
Sabine River	A	05	0500–0515	151				
Sabine Pass	A	24	2411	0				
Neches River	A	06	0600–0614	170				
Trinity River	A	06	0824–0841	78				
Trinity River	B	08	0800–0823		278			
San Jacinto River	B	10	1007, 1010–1014, 1017		346			
San Jacinto River	C	10	1000–1006, 1008–1009, 1015–1016			484		
San Jacinto–Brazos Coastal	C	11	1100–1113			88		
Trinity–San Jacinto Coastal	C	09	0900–0902			24		
Neches-Trinity Coastal	C	07	0700–0704			39		
Sabine Lake	C	24	2412			7		

River Basin	Basin Group	Basin No.	Segments	Approximate No. of State Permits				
				1996	1997	1998	1999	2000
East Bay, Trinity Bay	C	24	2422–2423			0		
Tabbs Bay	C	24	2426			7		
Black Duck Bay, Scott Bay, Burnett Bay	C	24	2428–2430			2		
Brazos River	D	12	1200–1255				406	
Brazos-Colorado Coastal	D	13	1300–1305				17	
Lavaca River	D	16	1600–1605				7	
Upper Galveston Bay	D	24	2421				8	
West Bay, Clear Lake	D	24	2424–2425				30	
San Jacinto Bay	D	24	2427				11	
Moses Bay, Chocolate Bay, Bastrop Bay, Christmas Bay, Drum Bay, Barbours Cut, Texas City Ship Channel, Bayport Channel, Lower Galveston Bay	D	24	2431–2439				35	
East Matagorda Bay, Cedar Lakes	D	24	2441–2442				3	
Colorado River	D	14	1417–1433				89	
Colorado River	E	14	1400–1416					131
Guadalupe River	E	18	1800–1818					69
San Antonio River	E	19	1900–1913					57
Rio Grande	E	23	2300–2314					117
Nueces River	E	21	2100–2117					27
San Antonio–Nueces Coastal	E	20	2000–2004					6
Colorado-Lavaca Coastal	E	15	1500–1502					5
Lavaca-Guadalupe Coastal	E	17	1700					4
Nueces–Rio Grande Coastal	E	22	2200–2204					35
Matagorda Bay, Tres Palacios Bay	E	24	2451–2452					5
Lavaca Bay	E	24	2453					13
Cox Bay, Keller Bay, Carancahua Bay	E	24	2454–2456					6

River Basin	Basin Group	Basin No.	Segments	Approximate No. of State Permits				
				1996	1997	1998	1999	2000
Espiritu Santo Bay, San Antonio Bay, Mesquite Bay	E	24	2461–2463					5
Aransas Bay, Copano Bay, St. Charles Bay	E	24	2471–2473					8
Corpus Christi Bay, Nueces Bay, Redfish Bay	E	24	2481–2483					21
Corpus Christi Inner Harbor, Oso Bay	E	24	2484–2485					31
Laguna Madre, Baffin Bay, South Bay, Brownsville Ship Channel	E	24	2491–2494					55
Gulf of Mexico	E	25	2500					2
Permit Totals				648	624	651	606	597

Clean Rivers Program

The Clean Rivers Program (CRP) is a statewide water quality assessment and data collection program administered by the OWRM. The program's goal is to assess the quality of water resources in each river basin in Texas through partnerships involving the TNRCC and regional and local stakeholders. Key components of this program that relate to the watershed management framework are summarized below.

Public Participation

Public participation in water resource management is an essential component of the watershed management approach. Basin steering committees are the primary forum for local participation in each river basin, and regional authorities seek input and support from these committees for water quality planning initiatives. Existing basin steering committees are excellent mechanisms to achieve the framework goal of increased public participation.

Basin Water Quality Monitoring Program and Quality Assurance Project Plans

The CRP's basin water quality monitoring program is another building block for the watershed management approach. This program addresses both basin and state monitoring objectives. It involves continuous coordination among the TNRCC's Surface Water Quality Monitoring (SWQM) Team, TNRCC regional offices, the Clean Rivers Program Team (CRPT), CRP contractors, councils of government, federal agencies, local governments, and individual permittees. Such coordination results in basin-specific strategic monitoring plans, including

- 💧 a list of monitoring objectives and performance criteria to indicate whether objectives have been met;
- 💧 a map with proposed sampling sites and existing monitoring stations for all basin monitoring efforts;

- 💧 a brief evaluation of site selection that considers (1) how a station will contribute to monitoring objectives, (2) availability of flow information, and (3) representativeness (e.g., proximity to point sources and tributaries);
- 💧 a proposed sampling regime that describes the frequency of sampling events, parameters to be measured, parties responsible for conducting sampling and analysis, and sampling and analytical methods;
- 💧 a proposed budget;
- 💧 a brief explanation of how the plan meets objectives;
- 💧 a data management plan;
- 💧 a methodology outlined to evaluate the effectiveness of the monitoring plan;
- 💧 targeted monitoring plans.

The current surface water quality monitoring approach in place through the CRP is three-tiered:

1. Fixed-station or baseline monitoring for temporal and spatial analysis
2. Systematic watershed monitoring at stations monitored on a rotational basis (e.g., once each five-year cycle) to further identify and quantify causes and sources of stress and impairment to water quality
3. Targeted monitoring to support the permitting process for individual permittees

To provide consistency and scientific validity, the CRP requires quality assurance project plans (QAPPs) to be submitted and approved by the TNRCC for each river basin. The QAPP is critical for establishing the protocols necessary for monitoring partners to plan, implement, and assess water quality data. Documenting each partner's adherence to proven quality assurance and quality control practices (see Glossary) ensures that environmental data are scientifically credible. The CRP's monitoring results may be used to

- 💧 characterize existing watershed conditions;
- 💧 evaluate spatial and temporal water quality status and trends;
- 💧 identify emerging problems;
- 💧 evaluate the effectiveness of water quality control programs;
- 💧 enhance the ability to establish appropriate water quality standards and target agency implementation activities (e.g., permits, grants, outreach, and technical help.)

Data collected by CRP participants for basin assessments will be comparable to data collected by TNRCC staff, ensuring its use for statewide analysis and comparability of all data in the TNRCC database. The CRP's basin monitoring plans and QAPPs in conjunction with the TNRCC's surface water quality monitoring program provide the basis for implementing the tasks of Phase 2 of the basin management cycle.

Water Quality Assessment

A consistent methodology for evaluating and analyzing data is critical to sound decision making. The CRP's protocols and techniques ensure the consistent analysis of conventional water quality parameters, such as dissolved oxygen, as well as nutrients and dissolved metals. The statewide methodology developed under the CRP ensures that assessments support regulatory and nonregulatory management activities. Assessments conducted according to this methodology can be used

to support development of corrective strategies involving surface water quality standards revisions, instream flow requirements, wasteload allocations, and wastewater discharge permit limits for conventional and toxic contaminants. The assessments may also support planning and informational products such as the statewide summary of water quality, nonpoint source assessments, priority lists for focusing state resources, and reports required by federal statutes. Using this consistent data assessment methodology, the OWRM will have a wealth of watershed-specific water quality data with which to target watersheds of concern and identify priority water pollution problems.

Data Management

To meet the challenge of gathering, arranging, analyzing, and disseminating large volumes of surface water quality data, the CRP has developed procedures for storing and using data, management protocols to ensure the consistent aggregation of different data sources into one database. These protocols cover all phases of creating a data management system, including planning, design, implementation, maintenance, and growth. Protocols are in place to maintain compatible data management systems, QA, analysis of data, and determined methodologies for spatial analysis using geographic information systems. Through the CRP, regional authorities have established regional water quality data clearinghouses for access by the public and permittees.

Additional Building Blocks

Questions for program managers and staff to consider when evaluating whether to incorporate more program activities within the watershed management approach include the following:

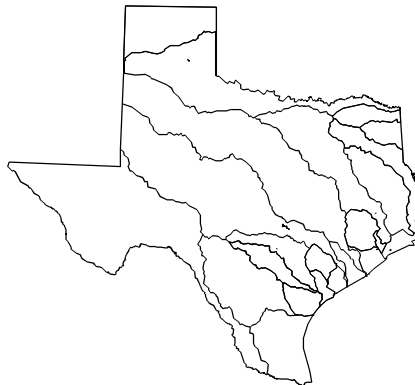
- 💧 Will a geographic focus (i.e., organizing activities by basins) improve the consistency and efficiency of the program's performance?
- 💧 Will synchronizing activities with the basin management cycle help programs balance work loads from year to year and improve long-term planning capability?
- 💧 Can activities among programs be consolidated or better coordinated to become complementary through the watershed management framework, including meeting multiple governmental mandates through a single process or outcome of the approach?
- 💧 Can individual program resources be leveraged with others through the framework to achieve goals and objectives to a greater extent than when acting alone?
- 💧 Will adding the program activity strengthen the framework and result in restoring or protecting Texas' water resources more effectively?

The remainder of this document focuses on roles and responsibilities defined for the initial subset of OWRM programs and activities outlined in Chapter 3, as well as a transition plan for implementing the approach. However, managers and staff not in these initial programs can also benefit by reviewing Chapters 4 through 6 to see examples that may stimulate ideas for other existing programs to participate in the watershed management approach.

Chapter 4

Completing the Framework for a Watershed Management Approach

The objective of the watershed management approach is to ensure that the OWRM programs, Field Operations Division, and other stakeholders collaborate, so that individual management efforts collectively result in cost-effective protection or restoration of water quality. The targeting, strategy development, and implementation activities of Phases 3 through 5 complete the cycle of activities to achieve this objective. Chapter 4 describes the activities necessary to develop and implement watershed action plans for priority watersheds and the support structure to facilitate these activities. Existing building blocks presented in Chapter 3 provide substantial support for primary activities in Phases 1 through 3 of the basin management cycle, including scoping, data collection, and assessment. These three phases will also result in the establishment of a consistent process to collect data which will support TMDL development for selected water bodies. Historically, these activities have been managed through individual, and relatively separate, programs. Under the watershed management approach, however, these activities will be linked through strategic planning to provide scientifically valid information and stakeholder input to water resource managers. Chapter 4 describes how the OWRM will adapt its operations under a watershed management cycle, with emphasis placed on key activities and functional relationships. Roles and responsibilities for carrying out these functions and activities are covered in Chapter 5. Currently, the TNRCC does not possess all of the staff resources necessary to achieve optimum implementation of the roles and responsibilities outlined in Chapters 4 through 6. The agency will implement the approach using existing staff resources and will look to adjust these resources over time to more effectively support the watershed management process.



Developing and Implementing Strategies for Priority Watersheds

Through activities occurring in Phases 1 through 3 of the basin management cycle, the OWRM works with other stakeholders in each basin (according to the statewide schedule) to clarify the sources and extent of impacts in those watersheds designated as priorities in Phase 1. Additional information is needed, however, to guide local, regional, and state resource managers in the strategy development phase. The process of moving from technical assessment of watershed conditions to the selection of specific issues within priority watersheds to be addressed through TMDLs (or watershed action plans) is referred to as targeting.

Targeting

The objective of the targeting activities in Phase 3 is to assist the OWRM and other stakeholders in determining what specific management efforts should be developed and included in the TMDL to address the known sources of impairment in priority watersheds. The TNRCC recognizes the fact that priority watersheds identified in Phase 1 often display multiple causes of impairment. A water body might be affected by one or several stressors that contribute to the nonattainment of each applicable water quality standard. A TMDL typically addresses a single pollutant or stressor. Thus, it is sometimes necessary to determine whether a single TMDL or several TMDLs are needed to address the problems of a body of water. However, a TMDL for multiple stressors may be developed if it is efficient to do so and the resulting TMDL will be scientifically sound in the judgment of the regulatory agency. The TNRCC also recognizes that agency time, resources, and funds available to address priority watersheds are limited and may be insufficient to deal with each source of impairment simultaneously. As a result, managers may be faced with choosing between actions within and among priority watersheds. Under the watershed management approach, OWRM managers will begin to make targeting decisions using the following series of assessment and planning steps.

1. *Determine the scale of the problem:* Identify the geographic level at which the priority issue is best addressed: site, water body/aquifer, watershed, or basin.
2. *Quantify the magnitude and severity of the problem and risk:* Identify the extent of ecological degradation (existing or potential) and the risks posed by the problem and its causes. For example, is human life or health threatened? Is there potential for irreversible damage to valuable resources? Will management costs increase significantly in the future if the problem is not handled immediately? Will the focus of management be restoration or protection?
3. *Rank priority problems:* Based on the findings of Steps 1 and 2, determine which problems pose the most serious risk and require immediate attention.
4. *Establish required degree of action:* Use models, comparative risk techniques, and professional judgment as appropriate to determine the degree of pollution reduction or physical restoration required to meet standards and objectives. For example, a lake water quality model might be used to project that a 40 percent reduction in phosphorus loading would restore the lake to an acceptable trophic status and reduce occurrences of nuisance algal blooms.
5. *Identify key stakeholders to address problem(s):* Identify public and private agencies, organizations, and individuals that have a significant role in solving the problem(s) to the degree required to achieve standards and objectives. This includes those with regulatory authorities (e.g., rule making, permitting, and enforcement) and nonregulatory capabilities (e.g., landowner best management practices, technical assistance, education, and outreach).
6. *Inventory stakeholder resources available for problem solving:* Survey expertise, funds, equipment, personnel, volunteers, and other available resources for developing and implementing management strategies in each priority watershed. Maintaining a suite of TNRCC water resource management tools from which to draw will expedite the allocation of available program resources. Table 4-1 provides a partial list of existing TNRCC management tools that support watershed management.
7. *Determine feasibility and estimate effectiveness:* Analyze a range of management options that key stakeholders might apply to address the problem(s), and determine their feasibility (technical, political, and financial) and effectiveness (singly or in combination) in achieving significant progress toward the desired standards and objectives.

At this point, stakeholders decide which priority watersheds are most in need of integrated management efforts. Through the analysis steps described above, basin stakeholders know which problems pose the greatest risks, where groups are willing and able to work together to solve the problems, and whether the problems appear to have feasible solutions. Basin representatives use this information to finalize the specific sources of impairment within priority watersheds which will be addressed in watershed action plans.

TMDL (Watershed Action Plan) Development

Key stakeholders within priority watersheds work together throughout Phases 3, 4, and 5 to develop and implement feasible, cost-effective action plans. The OWRM cannot conduct these activities by itself, because many solutions will require actions and authority that fall outside of the OWRM's jurisdiction. With its mission to ensure the protection and restoration of water resources, the OWRM has a vested interest in working with others to develop and implement TMDLs. Watershed management will be used to ensure that OWRM program implementation actions (e.g., permitting, point and nonpoint source project grants, enforcement, and outreach) are efficient and effective in addressing basin priorities and achieving water quality standards and management objectives.

The following steps are recommended to carry out the development of TMDLs or watershed action plans.

1. *Clarify watershed-specific management goals and objectives:* Local, regional, state, and federal stakeholders gather in the priority watershed to clarify watershed-specific management goals and objectives. Where appropriate, specific emphasis will be placed on establishing point and nonpoint source reduction goals for TMDLs in priority watersheds.
2. *Identify most promising management alternatives:* Based on the analysis performed during the targeting phase, watershed stakeholders choose promising management options or scenarios (i.e., combinations of management options) to achieve pollution reduction goals.
3. *Evaluate alternatives:* Stakeholders utilize technical expertise provided by local, regional, state, and federal entities and private consultants to identify indicators that link management alternatives to management objectives. Indicators are specific parameters associated with water resources that are meaningful to decision makers, are measurable, or can be ranked subjectively, and can be predicted in response to management options. Future conditions in the watershed are then evaluated under different management alternatives. Results for key indicators are compared across scenarios to determine which alternative or combination of alternatives best meet the management goals and objectives.
4. *Select optimal management strategies and draft action plan.* Stakeholders consider results from the evaluation of alternatives and other key decision criteria (e.g., degree of certainty in achieving results, potential for unintended consequences, and ability to retrofit solutions when unexpected conditions occur), and then select the optimal management strategies. An action plan is prepared to describe the methods, stakeholder roles and responsibilities, funding, and timetables for strategy implementation.
5. *Finalize and implement action plan.* Draft TMDLs or watershed action plans will be circulated among the watershed community and stakeholders to raise awareness and fine-tune recommendations. After finalization, implementation of plan provisions begins.

Table 4-1. Partial List of Existing TNRCC Tools for Water Quality Management

Description of Watershed Management Tools	Managing Team
Strategic Monitoring	
Ambient and targeted water quality sampling	Clean Rivers Program Team, Surface Water Quality Monitoring Team, Texas Watch Volunteer Monitoring Team, Nonpoint Source Program Team, Field Operations Division
Performance monitoring of best management practices and effectiveness of watershed action plans	Clean Rivers Program Team, Surface Water Quality Monitoring Team, Texas Watch Volunteer Monitoring Team, Nonpoint Source Program Team, Field Operations Division
Planning	
Water quality/watershed modeling	Water Quality Modeling Team
Water quality management planning	Watershed Management Team
Nonpoint source management planning	Nonpoint Source Program Team
Estuary water quality management planning	Galveston Bay Estuary Program, Corpus Christi Bay National Estuary Program

Description of Watershed Management Tools	Managing Team
Technical Assistance	
Wellhead protection plans Water conservation plans Operation and maintenance plans for wastewater plants QA/QC guidance Water quality monitoring guidance Volunteer monitoring training Pretreatment program audits Review wastewater plant specifications and wastewater reuse plans Use attainability analysis for stream classification Best management practices for nonpoint source pollution management Voluntary cleanup of contaminated/polluted facilities	Source Water Protection Program Team, Surface Water Uses Team Water Rights Conservation Team Industrial Permits Team, Municipal Permits Team, Plan Review Team Clean Rivers Program Team, Surface Water Quality Monitoring Team Clean Rivers Program Team, Surface Water Quality Monitoring Team Texas Watch Volunteer Monitoring Team Pretreatment Team Pretreatment Team, Industrial Permits Team, Municipal Permits Team Water Quality Standards Team NPS Program Team Voluntary Cleanup Section
Educational/Outreach	
Texas Watch annual meeting for volunteer monitors Texas Watch regional meetings Rio Grande Basin computer bulletin board system and Internet home page OWRM Internet home page Nonpoint source pollution informational materials Basin steering committee meetings TNRCC Water/Wastewater annual seminars Environmental education (grades K–12) CLEAN TEXAS 2000 program Environmental Information Line Storm drain stenciling program	Texas Watch Volunteer Monitoring Team Texas Watch Volunteer Monitoring Team Border Environmental Assessment Team Office of Water Resource Management Nonpoint Source Program Team, Groundwater Nonpoint Source Team, OPPR Clean Rivers Program Team, Border Environmental Assessment Team Various TNRCC programs Office of Pollution Prevention and Recycling Office of Pollution Prevention and Recycling Agency Communications Division Office of Pollution Prevention and Recycling
Funding	
CWA §319 grants CWA §604(b) grants CWA §104(b)(3) grants	Nonpoint Source Program Team Clean Rivers Program Team, Modeling Team Office of Water Resource Management

Description of Watershed Management Tools	Managing Team
Supplemental environmental project funds	Office of Pollution Prevention and Recycling
Nonregulatory Mechanisms	
Voluntary watershed management implementation	Source Water Protection Team, Nonpoint Source Program Team, Groundwater Nonpoint Source Team
Household hazardous waste and agricultural waste collection	Office of Pollution Prevention and Recycling
River and lake cleanup events	Office of Pollution Prevention and Recycling
Regulatory Mechanisms	
Wastewater permits, including agriculture facility and storm water permits as required	Industrial Permits Team, Municipal Permits Team, Plan Review Team, Applications Team, Agricultural Permits Team
Water quality standards	Modeling Team, Water Quality Standards Team
§404 certification of §401 dredge and fill permits	Surface Water Quality Standards Team
On-site sewage facility (OSSF) permits	Office of Compliance and Enforcement, Compliance Support Division
Occupational certification (licensing and training)	Office of Compliance and Enforcement, Compliance Support Division
Outstanding Natural Resource Waters designation	Water Quality Standards Team
Regulatory Mechanisms (TAC 213 and 216, Edwards Aquifer and Water Quality Protection Zones)	Austin and San Antonio regional offices
Enforcement actions	Office of Compliance and Enforcement, Field Operations Division
Emergency spill response	Office of Waste Management, Pollution Cleanup Division
Stream classification	Water Quality Standards Team, Water Quality Modeling Team

Support Structure for Watershed Management

Implementing a watershed management approach will require the OWRM to link existing program activities through a strategic watershed planning process. Adapting to this new paradigm will be facilitated by establishing key support structures that make coordinated planning easier and more efficient. Functional areas that benefit from these support structures include stakeholder coordination, technical planning, information management, communications and outreach, and financing.

Three forums for involving and coordinating stakeholders were described in Chapter 2: basin coordinators, basin steering committees, and priority watershed subcommittees. The support functions of these three entities in relationship to OWRM programs and CRP contractors are described below in more detail and depicted in Figure 4-1.

Basin Coordinator Support Functions

The OWRM proposes the use of basin coordinator positions to support the necessary coordination among OWRM programs and stakeholders at the basin level for the entire state. The agency recognizes that successful management of 15 major river basins, eight coastal basins, nine estuarine systems, and the extraterritorial waters of the Gulf of Mexico

using a watershed management approach will require substantial coordination among organizations statewide. Each coordinator will be assigned several basins, for which they will provide the following types of support:

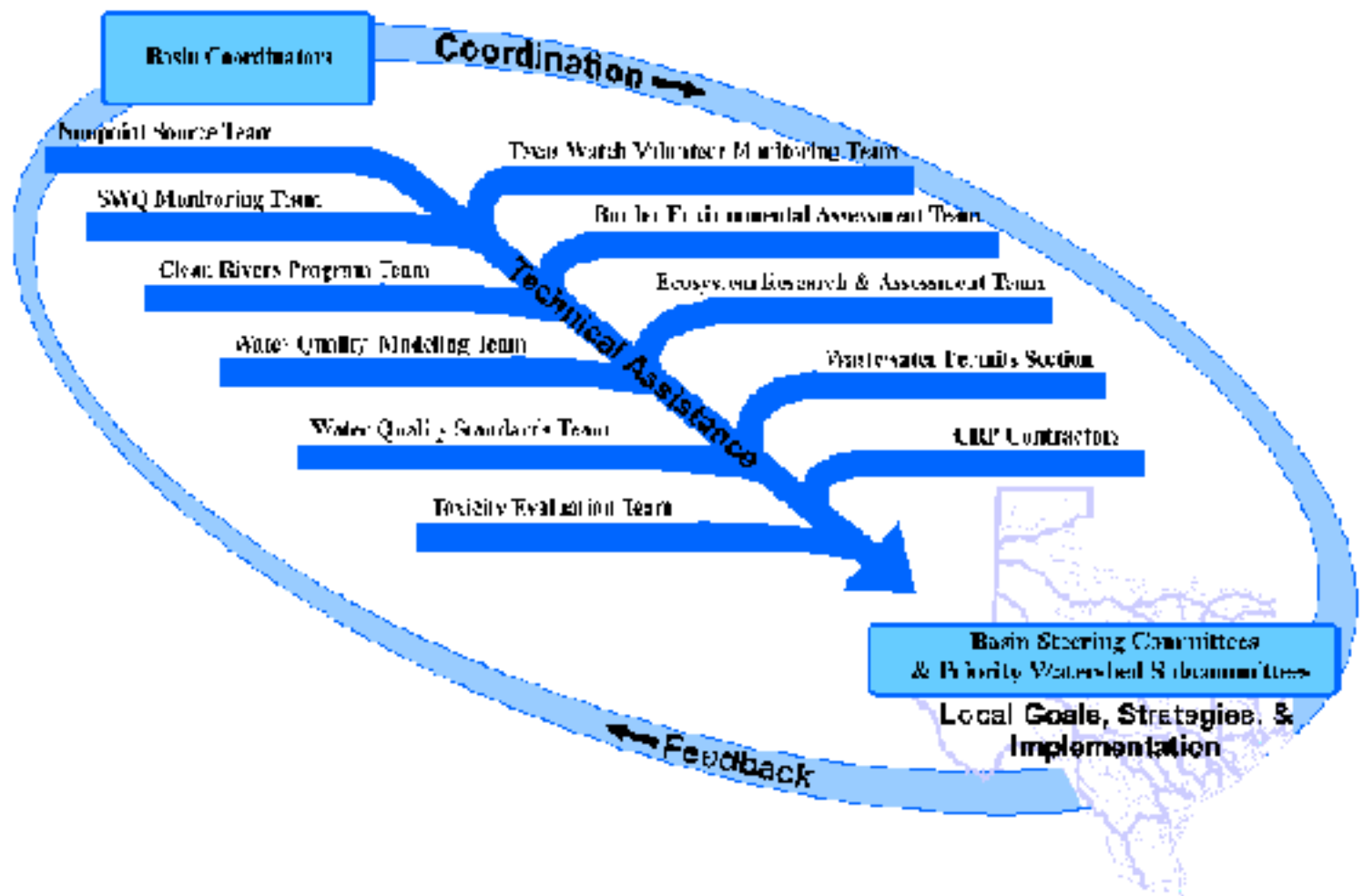
- 💧 *Communication:* Coordinators are the principal point of contact between OWRM programs and other agencies, elected officials, and the public regarding framework components, management cycle activity schedules, and progress reports. Coordinators support outreach activities to build new partnerships and strengthen commitment for the watershed management approach.
- 💧 *Facilitation:* Coordinators facilitate internal dialogue and planning functions for the OWRM as needed to troubleshoot problem areas or maintain milestone schedules. Additionally, coordinators will work with partners outside of the OWRM such as CRP contractors, basin steering committee members, and local priority watershed subcommittee members to facilitate interaction and exchange of information.
- 💧 *Documentation:* A single watershed action plan may be prepared by several different groups, including individual OWRM programs and priority watershed subcommittees. Coordinators will serve as a clearinghouse, compiling sections and overseeing editing of the final plans.
- 💧 *Quality Control:* Partnerships, available resources, and the content of activities will vary from basin to basin. Coordinators will compare implementation of the framework among basins across the state and will provide a quality control function, working to ensure consistent implementation of framework components.
- 💧 *Framework Maintenance:* Given the dynamic nature of watershed management, the framework will need to be periodically refined and updated to adapt to changing needs. Coordinators, as primary points of contact, are in a good position to compile ideas for refining the framework and convey them to OWRM management for adoption and implementation by participating programs.

Basin Steering Committee Support Functions

Currently, basin steering committees established through the Clean Rivers Program provide direction, recommendations, and goals relevant to the basinwide perspective. Under the watershed management framework, the basin steering committee concept will be continued and expanded. Basin steering committees should include a broad, balanced spectrum of stakeholders so that decisions on priorities for targeting watershed management efforts within a basin and communication of basin management needs are truly representative. Primary functions of the committees will include:

- 💧 *Communication:* Basin steering committees provide a consistent forum for communicating watershed management goals, priorities, management strategies, and implementation activities among local, regional, state, and federal stakeholders. Committees meet at strategic times during the management cycle to ensure that key information and issues are shared and discussed.
- 💧 *Advisory (basin-specific):* At the beginning of the management cycle, the basin steering committees will provide the forum for dialogue regarding OWRM agency priorities related to watershed management activities in their basins. Discussions will include input on §303(d) listed waters (i.e., impaired or threatened waters designated for development of total maximum daily loads) and identifying other basin priorities, nonpoint source program updates, and strategic data collection and monitoring needs to fill information gaps and support action plan development for priority watersheds. Later in the cycle, committees may be called upon to recommend how to target available stakeholder resources for the basin in light of competing needs among the priority watersheds.
- 💧 *Recruitment of Local Participants:* The steering committees will function as recruiters, actively encouraging participation of key local stakeholders in priority watershed subcommittees that will assist the development of watershed action plans. This function is based on the premise that basin steering committee members will be in a better position to identify and network with key local officials, business leaders, landowners, citizen groups, and others to be included in the process.

Figure 4-1. Functional Relationships to Support a Basin-by-Basin Approach



- 💧 *Basin Document Review:* Additionally, basin steering committees will review key basin reports and outreach documents (e.g., basin summary reports and financial summary reports) to ensure that contents accurately communicate steering committee involvement and how efforts are related to basin priorities.

Priority Watershed Subcommittee Support Functions

Priority watershed subcommittees represent a new forum to both increase public involvement in implementing management solutions and provide the OWRM with more local stakeholder input on developing management priorities and activities. Local stakeholders need an easily accessible venue for providing input on management goals and objectives for their watershed, and they are usually in the best position to know what is feasible regarding management actions that can be implemented at the grassroots level. Priority watershed subcommittees would be set up, therefore, to support the following key functions for the framework:

- 💧 *Advisory (watershed-specific):* After priority watershed subcommittees are formed by the basin steering committees, the subcommittees will become the primary forum for obtaining input to establish and implement watershed action plans. Initial activities in a given cycle will include clarifying watershed-specific management goals and objectives and identifying the most promising management options that appear to be both technically and politically feasible. Throughout the remainder of the cycle, subcommittees will act in an advisory capacity providing feedback on management option evaluations, action plan documentation, and implementation considerations.
- 💧 *Technical Planning:* Subcommittees will use technical expertise (provided by local, regional, state, and federal entities, and private consultants) to evaluate proposed management options to ensure that they meet the objectives established for water quality within the watershed. Based on the results of these evaluations, the subcommittees will then select optimal management strategies. Additionally, the subcommittee forum will be used to identify and document key components of the action plan, including implementation means and funding, roles and responsibilities of key stakeholders, and implementation milestones and schedules.

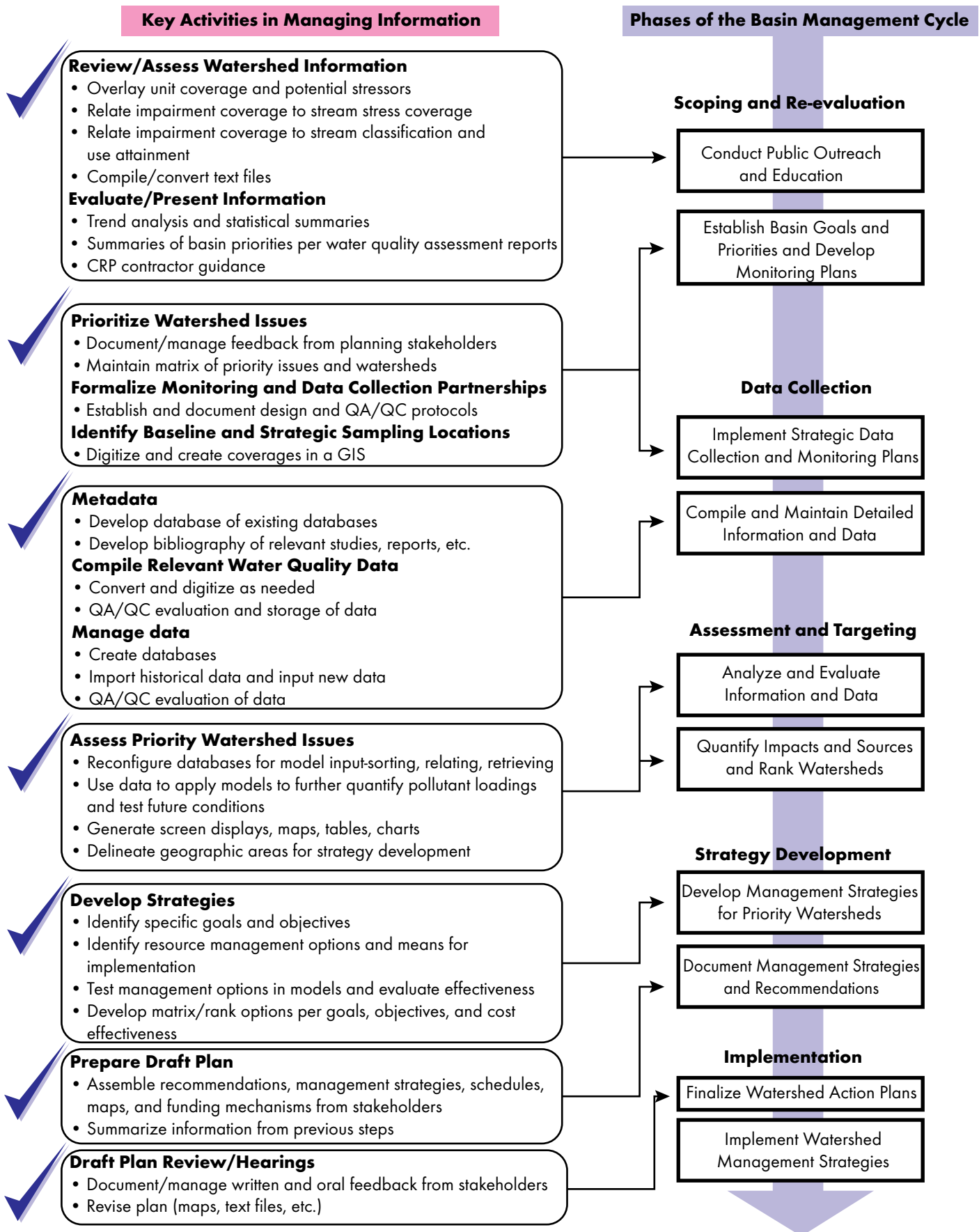
Information Exchange and Management Functions

An adequate system to support information exchange and management throughout the basin management cycle is essential. Coordination and communication among OWRM programs and with other stakeholders require that information is made available, shown to be reliable, presented in useful and understandable forms, and updated as needed to track management progress. The OWRM and several other key agencies and organizations have assembled much of the hardware needed to store and retrieve large amounts of watershed-related information. The watershed management approach may, however, require refining procedures to ensure that the appropriate types of information are compiled, quality-assured, and accessible for analysis and presentation at appropriate times.

Figure 4-2 displays examples of information types and data management activities associated with the basin management cycle. Some functions to be supported under the watershed management approach include the following:

- 💧 *Presentation of Basin Information:* Early in Phase 1 of the cycle, previously compiled assessment information will need to be presented at public forums within the basin. Presentations will require the capability to compile and consolidate information from a broad range of sources. Additional support capabilities include generating presentation graphics and maps. Application of these functions will continue throughout the basin management cycle.
- 💧 *Recording Public Input:* Throughout the cycle, public input will be gathered on several key outcomes including priority watersheds, targeted management issues, candidate management options, and priority watershed action plans. Maintaining a historical record will allow future referencing of this input, and thereby provide continuity from one iteration of the basin management cycle to the next. Not having to start over from scratch with each iteration is one source of the efficiency of the basin management cycle;

Figure 4-2. How Information Management Relates to the Basin Management Cycle



however, this benefit can be achieved only if information is compiled, stored, and easily retrievable.

💧 *Recording Management Activity Outputs:* Key outputs from core management activities are generated throughout the cycle, and they require management for long-term reference. Early in the cycle, a matrix of priority issues and watersheds is generated and followed by development of a strategic data collection and monitoring plan to fill information gaps and to support management strategy development. In Phases 3 and 4, analysis and assessment results are generated that help target management efforts and modeling results that compare the effectiveness of alternative management strategies. Phase 4 also includes the compilation of information into priority watershed action plans. Protocols are needed to compile, store, and manage this information.

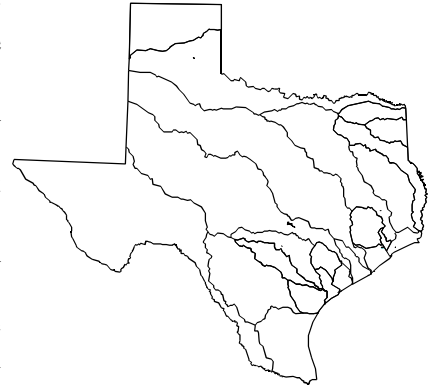
💧 *Managing Data:* Watershed-related data are typically generated and maintained by a broad range of programs and organizations. Knowledge of who collected the data, what the database consists of, when it was created, how often it is updated and how its quality is assured is important to support widespread use of the information. Additionally, some data will be converted and digitized for use within GIS. Therefore, protocols for managing data should be refined to ensure support for implementation of the watershed management approach.

As a part of the transition to the watershed management approach, the OWRM will need to work with its programs and other interested parties to refine information exchange and management procedures, in order to support these and other needed functions. The next steps to establishing this level of support are outlined in Chapter 6.

Chapter 5

Roles and Responsibilities

Texas' statewide watershed management approach does not supersede any agency or program components. Rather, it establishes a consistent approach to more efficiently coordinate OWRM's water quality management programs. It is important to note that not all water resource programs need to be synchronized with the basin management cycle. Thus, Chapter 5 summarizes only specific roles and responsibilities for participants that coordinate watershed management implementation and for the surface water quality programs within the TNRCC that are involved in initial implementation. Descriptions of these roles and responsibilities are presented in two ways. First, they are summarized as individual programs so that each program or organization can see its collective set of primary responsibilities. Second, they are displayed in a table that is sorted by phase of the basin management cycle, so that all participants can see how activities and responsibilities are integrated and sequenced.



Roles and Responsibilities of OWRM and Regional Field Operations

The OWRM has taken on leadership responsibility for general coordination and oversight of the watershed management approach, with the TNRCC Field Operations Division as a key partner. Specific roles and responsibilities for each program are described in this section. The corresponding phase of the basin management cycle (see Figure 2-2) in which each program activity will be conducted is also listed.

Specific roles and responsibilities in the watershed management approach have been identified for several OWRM programs. As the OWRM positions itself to begin implementation in fiscal year 1997, programs will stress the following qualities:

- 💧 *Synchronization:* Not all water resource programs need to be synchronized with the watershed management framework—only those where synchronization will lead to more efficient, effective resource management. Throughout the watershed management approach, there are two aspects to synchronization: synchronization of program activities to coincide with the five phases of the basin management cycle, and synchronization of program resources, commitments, and outputs to coincide with a specific group of river basins according to the statewide schedule. For many key activities that are synchronized, one program team will take the lead responsibility for coordinating efforts.
- 💧 *Flexibility:* Most program teams will play both lead and supporting roles in implementing the watershed management approach. Although this chapter suggests a division of responsibility, roles and responsibilities will likely evolve over time and vary by watershed. Realistic roles for working together based on the basin management cycle have been identified, but changes will occur over time as coordination improves among teams.
- 💧 *Communication:* The primary value of Texas' watershed management approach is that it enables OWRM programs and other participating stakeholders to leverage expertise and jointly pursue a broader range of management options to address high priority water quality concerns. The success of the approach will be measured by how well implementation achieves the goals described in Chapter 1 (e.g., improving public participation, increasing the scientific validity of decisions, improving administrative efficiency, and implementing cost-effective solutions to water quality problems).

Basin Coordinators

The OWRM recommends creating basin coordinator positions to support watershed management coordination at the basin level. For an assigned set of basins, each coordinator would support communication, facilitation, documentation, quality control and framework maintenance. In the future, basin coordinator positions may be integrated with the CRP team.

Suggested lead roles include:

in Phase(s):

- | | |
|---|-----|
| Assisting OWRM programs to keep basin management activities on the adopted schedule | 1–5 |
| Scheduling and facilitating OWRM meetings at key points during the basin management cycle | 1–5 |
| Attending steering committee meetings and coordinating basin management cycle tasks and activities with the divisions and other agencies and groups | 1–5 |
| Acting as principal point of contact with elected officials, other agencies, and the public on watershed management issues | 1–5 |
| Compiling and editing watershed action plans according to uniform standards and guidelines | 4 |
| Facilitating public comments on individual watershed action plans between OWRM team leaders and priority watershed subcommittee members | 4 |

Suggested support roles include assisting in:

in Phases:

- | | |
|--|-----|
| Obtaining new funding for the divisions to support basin management activities | 1–5 |
| Periodic updates on basin management progress for the TNRCC executive director, OWRM deputy director, and division directors | 1–5 |
| Development of division-specific work plans for basin management activities with OWRM team leaders | 1–5 |
| Linking division budgets to support the basin process | 1–5 |

Surface Water Quality Monitoring Team

The Surface Water Quality Monitoring (SWQM) Team is responsible for determining the status of the state's waters through ambient and targeted monitoring. Building on work conducted in recent years, strategic, coordinated monitoring will be a cornerstone of this watershed management framework.

Lead roles include:

in Phase(s):

- | | |
|--|-----|
| Preparing the statewide ambient fixed-station and basin-specific strategic monitoring plans, which will be used to establish monitoring work plans for TNRCC Field Operations, SWQM, CRP contractors, and Texas Watch volunteers | 1 |
| Collecting physical, chemical, biological, hydraulic, and hydrologic data as well as using existing data to characterize point and nonpoint source pollution impacts to support modeling for TMDL assessment | 1–3 |
| Conducting intensive surveys, special studies, use attainability analysis, and related activities to establish/verify stream standards and to support development of TMDLs and allocation of waste loads | 2–3 |
| Developing quality assurance project plans for SWQM monitoring | 1 |
| Compiling and drafting components of the CWA §305(b) report, which describes the status of the state's waters | 3–5 |
| Evaluating §305(b) data and all other available information to support preparation of the §303(d) list | 4 |

Support roles include assisting in:

- 💧 Public outreach and technical assistance activities that communicate results of §305(b) report and §303(d) list preparation
- 💧 Determination of the scale, magnitude, location, and severity of water quality issues
- 💧 Determination of priority watersheds
- 💧 Development of improved quality controls and methods for biological monitoring to support water quality standards determination

in Phases:

1–3
3–5
5–1
2–3

Water Quality Modeling Team

The Water Quality Modeling Team assesses water quality data to establish TMDLs and recommend water-quality-based wastewater permit effluent limits for conventional pollutants.

Lead roles include:

- 💧 Developing CWA §303(d) list as a key component of the priority watershed list
- 💧 Developing and applying models to develop TMDLs for priority watersheds
- 💧 Developing draft scenarios for point and nonpoint source pollution load reductions
- 💧 Assessing technical effectiveness of alternative management strategies
- 💧 Developing permit conditions, as needed, to meet antidegradation requirements

in Phase:

5
3
4
3
4

Support roles include assisting in:

- 💧 Preparation of a targeted monitoring plan
- 💧 Determination of the scale, magnitude, location, and severity of water quality issues
- 💧 Determination of current and potential loads attributable to point and nonpoint sources
- 💧 Selection of priority watersheds
- 💧 Development of management strategies for watershed action plans

in Phase(s):

1
3–5
3–4
5–1
3–5

Water Quality Standards Team

The Water Quality Standards Team is responsible for systematically developing and adopting surface water quality standards through a triennial review process. Additionally, the team conducts special studies, as needed, to classify previously unclassified waters and support development of site-specific water quality standards. Water quality standards will not be revised on an annual basis within each group of river basins. Regional or site-specific revisions to existing water quality standards would most likely be the outcome of special studies in priority watersheds and would correspond with Phase 4, Strategy Development. This would allow immediate application of the standards to effluent limits in wastewater permits to be issued in the following year during Phase 5, Implementation. The rule adoption process required for major changes to statewide water quality standards would be conducted when appropriate.

Lead roles include:

- 💧 Identifying areas that should be targeted for standards review and classification
- 💧 Proposing new standards and where appropriate revisions to existing standards
- 💧 Developing permit conditions, as needed, to meet antidegradation requirements
- 💧 Conducting public hearings on proposed new standards

in Phase:

1
4
4
5

Support roles include assisting in:

- 💧 Development of a monitoring plan for use attainability analyses, permit review, and new standards and criteria
- 💧 Preparation of targeted monitoring plans (site selection for rapid bioassessments and receiving water assessments)
- 💧 Evaluation of §305(b) reporting data to support preparation of §303(d) list

in Phase:

1
1
4

Toxicity Evaluation Team

The Toxicity Evaluation Team plays a critical role in the wastewater permitting process by providing flow, toxic, and biomonitoring criteria to the permitting section.

Lead roles include:

in Phase(s):

- | | |
|--|-----|
| Establishing biomonitoring requirements and numeric toxic limits for wastewater permits | 3–4 |
| Establishing the dry-weather low-flow limits for attaining chronic aquatic life criteria to support TMDL development | 2 |

Support roles include assisting in:

in Phase(s):

- | | |
|---|-----|
| Public outreach activities which support watershed management | 1–2 |
| Compilation and evaluation of self-reporting data from permittees | 2–3 |
| Preparation of targeted monitoring plans (site selection for flow monitoring) | 1 |
| Development of criteria for wet-weather loadings | 2–3 |

Texas Watch Volunteer Monitoring

The goal of Texas Watch is to provide watershed-based environmental outreach and education through volunteer monitoring networks. Volunteer monitoring will support the basin specific monitoring objectives identified by SWQM and TNRCC Field Operations.

Lead roles include:

in Phase(s):

- | | |
|--|-----|
| Coordinating the planning and implementation of a citizen volunteer monitoring plan based on recommendations provided by the SWQM Team | 1–3 |
| Developing/revising the quality assurance project plans for citizen monitoring | 5–1 |
| Maintaining a citizen monitoring database | 3 |
| Initiating community action projects | 3 |

Support roles include assisting in:

in Phase(s):

- | | |
|--|-----|
| Public outreach activities that support watershed management | 1–3 |
| Identification of watersheds for special studies and assessments | 1 |
| Integration of professional and volunteer programs and resources | 1–5 |
| Solicitation of public input throughout the each phase of the basin management cycle | 1–5 |

Ecosystem Research and Assessment Team

The Ecosystem Research and Assessment Team has responsibilities primarily connected to supporting water rights or water quantity issues. Through the watershed management approach, however, the team will begin to play a more significant role in water quality issues, specifically in monitoring and assessment.

Lead roles include:

in Phase(s):

- | | |
|--|-----|
| Developing an integrated water resource assessment protocol for use attainability analysis and instream use assessment (Rio Grande/Pecos River Index of Biological Integrity) | 2 |
| Conducting coastal assessments | 3 |
| Conducting intensive field surveys that provide detailed analysis of instream flow (hydrology), biology, stream habitat, and physical and chemical characteristics of the water body, to assess the impact of water rights diversions on water quality | 2–3 |

Support roles include assisting in:**in Phase(s):**

- | | |
|---|-----|
| Collection of flow criteria and biological data for wastewater permitting and setting of water quality standards | 2 |
| Data collection and assessment for use attainability analysis reports in basins or watersheds where there is a high level of current or projected water rights permitting activity | 2 |
| Preparation of monitoring plans for intensive surveys and receiving water assessments | 1–2 |
| Prioritizing basins that require updated hydrologic models to support development of TMDLs, nonpoint source loading estimates, and water quantity permits. Some criteria to be considered when establishing priorities for water quantity modeling are: | 4–1 |
| ◆ Date of the existing hydrologic model available for each basin | |
| ◆ Number of water right permits in each basin | |
| ◆ Assessment information provided by the Ecosystem Research Team in the CWA §305(b) report that identifies areas where water use is projected to affect water quality | |
| ◆ Availability of existing hydrologic models from other state or federal agencies | |
| ◆ Projected growth within a basin which would lead to potential water right applications | |

Nonpoint Source Team

The Nonpoint Source Team is responsible for implementing CWA §319 requirements, including identifying impacts from nonpoint sources of pollution, developing management strategies to address them, and administering a related federal grant program to support implementation of best management practices.

Lead roles include:**in Phases:**

- | | |
|--|-----|
| Supporting development of permitting and nonpoint source management decisions by | 3–5 |
| ◆ Compiling water quality and nonpoint source indicator data | |
| ◆ Collecting information on existing or anticipated urban and agricultural nonpoint source best management practices | |
| ◆ Analyzing data to determine the existing or potential impact of nonpoint source pollution as well as impaired uses attributable to nonpoint source pollution | |
| ◆ Drafting the nonpoint source assessment report for inclusion in the CWA §305(b) report and watershed action plan | |
| ◆ Updating nonpoint source management programs for each basin | |
| Working with the CRP and basin steering committees to identify local stakeholders for implementation of CWA §319 grant work plans in targeted, high-priority watershed areas | 4–5 |
| Establishing contracts with local stakeholders and providing technical assistance for implementation of CWA §319 grant work plans in targeted, high-priority watershed areas | 4–5 |
| Evaluating the effectiveness of nonpoint source work plans in meeting nonpoint source pollution load reductions | 5–1 |

Support roles include assisting in:**in Phase(s):**

- | | |
|---|-----|
| Public outreach activities that support watershed management | 1–5 |
| Evaluation of the current loadings attributable to nonpoint versus point source pollution | 3 |
| Development of total maximum daily loads and nonpoint source pollution load reductions | 3–4 |

- | | |
|---|-----|
| 💧 Evaluation of the effectiveness of existing or anticipated nonpoint source management activities in meeting nonpoint source pollution reduction goals | 1–5 |
| 💧 Development of management strategies for watershed action plans | 4–5 |

Clean Rivers Program Team

The Clean Rivers Program Team coordinates the collection and assessment of surface water quality data within each river basin through partnerships and contracts with the TNRCC. The CRPT provides oversight essential for leveraging the resources of CRP contractors while maintaining quality control and accountability in the program.

Lead roles include:

in Phase(s):

- | | |
|--|-------|
| 💧 Developing and issuing guidance to appropriate CRP contractors regarding: | 1–4 |
| ◆ Data collection (including water quality monitoring, collecting existing point and nonpoint source data, population estimates, existing local land use, and existing or planned local watershed and water quality protection measures) | |
| ◆ Use of data to support TMDL assessment and strategy development | |
| ◆ Assessment modeling requirements | |
| ◆ Public participation and education | |
| ◆ Management and approval of CRP contractors' quality assurance/quality control plans | |
| 💧 Coordinating partners' data assessment to identify priority water quality problems and priority watersheds | 1,3,5 |
| 💧 Coordinating strategy development for addressing point and nonpoint source problems in priority watersheds | 3–4 |
| 💧 Compiling watershed action plan components | 4 |
| 💧 Updating and integrating CRP's long-term action plan with the statewide watershed management approach | 1 |

Support roles include assisting in:

in Phase(s):

- | | |
|---|-----|
| 💧 Basin steering committee meeting activities | 1–5 |
| 💧 Development of strategic monitoring plans and special studies | 1–2 |
| 💧 Public outreach activities that support watershed management | 1–3 |
| 💧 Watershed-based data collection | 2–3 |
| 💧 Determination of the scale, magnitude, location, and severity of water quality issues | 1 |
| 💧 Negotiations of point and nonpoint source pollution load reductions | 3–4 |

Border Environmental Assessment Team

The Border Environmental Assessment Team (BEAT) is responsible for monitoring and assessing the water quality of the Rio Grande and the Nueces Coastal Basins. Because they are responsible for select phases of the implementation of the CRP, the BEAT is involved in numerous projects which require cross-program coordination and GIS applications to support ongoing watershed-based efforts.

Lead roles include:

in Phase(s):

- | | |
|--|-----|
| 💧 Assessing water quality in the Rio Grande Basin (RGB) (which includes, in Texas, the Pecos and Devils Rivers, the Arroyo Colorado and the lower Laguna Madre), and the Nueces Coastal Basins (NCBs), by drawing on a wide range of available water-quality-related data to help establish watershed priorities | 2–3 |
| 💧 Publishing updates to the Texas CRP water quality assessment reports in the RGB and NCBs | 2–3 |

Developing comprehensive water quality monitoring plans for the RGB and NCBs that address local, state, and federal information needs while minimizing redundancy	1–2
Developing ways to increase opportunities for basin residents to play a stronger, better-informed role in governing water resources	1–5
Preparing QAPPs for projects in their basins	1
Managing data	1–5
Compiling watershed action plan components	4
Coordinating with local, state, and federal agencies and organizations to initiate implementation projects that address identified water quality problems	5

Support roles include assisting in:**in Phases:**

Development and implementation of the Rio Grande Alliance, a forum to support a collaborative planning process to address natural resource and public health issues affecting the Rio Grande/Rio Bravo watershed	1–5
Environmental monitoring and assessment projects (both internally and externally) to fill gaps in water quality information	2–3
Preparation of guidance for CRP contractors	1–4
Establishment and maintenance of a basin steering committee, and administering steering committee meetings and public participation forums	1–5

Wastewater Permits Section

The Wastewater Permits Section of the Agriculture and Watershed Management Division is responsible for administering the state wastewater permitting program. This section reviews all new applications, renewals, and amendments for industrial and municipal wastewater permits.

Lead roles include:**in Phase(s):**

Evaluating applications to discharge by rule	1–5
Evaluating and approving engineering plans for domestic wastewater treatment facilities	1–5
Performing pretreatment program audits for publicly owned treatment works	2–3
Determining administrative completeness of applications for industrial and municipal wastewater permits	5
Communicating with local stakeholders and applicants during the permitting process	4–5
Defining high-priority watershed areas	4–5
Participating in public hearings, public meetings, and mediation meetings in finalizing permit effluent limitations	4–5
Preparing draft industrial and municipal wastewater permits in conjunction with the Permit-by-Basin Rule (TAC §305.71)	5

Support roles include assisting in:**in Phase(s):**

Finalization of wasteload allocations	4
Determination of the location and need for receiving water assessments	5–1
Public outreach	1–5

TNRCC Regional Field Operations

Field Operations regional offices play a key role in watershed management at the local watershed level because of their long-standing relationship with local governments and the regulated community. Regional office responsibilities with regard to water quality management include ambient monitoring, compliance inspection, education and technical assistance, responding to citizen complaints, and responding to emergency spills.

Lead roles include:**in Phase(s):**

- | | |
|---|-----|
| Collaborating with the SWQM Team to establish and implement a comprehensive water quality monitoring plan | 1 |
| Completing receiving water assessments in priority segments to support permitting | 2–3 |
| Investigating fish kills and water quality complaints | 1–5 |
| Conducting special study monitoring to support TMDL development and water quality standards revisions | 1–3 |
| Reporting SWQM data, fish kills, and field investigations | 1–5 |

Support roles include assisting in:**in Phase(s):**

- | | |
|--|-----|
| Public education, outreach, and technical assistance to basin steering committees | 3–5 |
| Training partners in the cooperative monitoring program to conduct receiving water assessments | 3–4 |
| Preparation of assessment reports for special studies | 3 |

Forums for Regional and Local Coordination

To efficiently coordinate participation of basin stakeholders, the OWRM will rely on two primary forums: basin steering committees and priority watershed subcommittees. The primary functions of these forums were described in Chapter 4. Their specific roles and responsibilities are described below.

Basin Steering Committees

The basin steering committees were created in 1992, in response to the Clean Rivers Act, to serve as the primary forum for local participation in basin planning and assessment. The watershed management approach relies heavily on participation from these committees and seeks to strengthen and expand their responsibilities.

Suggested lead roles include:**in Phase(s):**

- | | |
|--|-----|
| Identifying and prioritizing local concerns | 1 |
| Developing/finalizing a list of priority watersheds in the basin in cooperation with the state agencies and CRP contractors | 1 |
| Recruiting local participation from stakeholders to serve on priority watershed subcommittees | 2–5 |
| Making choices between priority watersheds within the basin with regard to resource expenditures to address point and nonpoint source problems | 3–4 |
| Reviewing and commenting on the CRP financial summary reports prepared every two years by the CRP contractors and the TNRCC | 1–5 |

Suggested support roles include assisting in:**in Phases:**

- | | |
|--|-----|
| Public education and outreach | 1–5 |
| Water quality data collection | 1–3 |
| Review and feedback on: | 1–5 |
| ◆ Preliminary data analysis | |
| ◆ Draft list of priority watersheds and concerns | |
| ◆ Draft monitoring plan | |
| ◆ Targeted assessments conducted by the TNRCC | |
| ◆ Proposed strategies | |

Priority Watershed Subcommittees

As a subset of the basin steering committees, priority watershed subcommittees will be set up as a forum to expand local

input and support in watersheds selected for implementation of pollution control strategies. Priority watershed subcommittees will provide valuable input into the technical planning activities and strategy development phase associated with priority watersheds.

Suggested lead roles include:

- ☹ Clarifying watershed-specific management goals and objectives
- ☹ Providing information on existing protection measures in priority watersheds
- ☹ Identifying potential management options for further evaluation
- ☹ Evaluating management alternatives
- ☹ Identifying preferred management alternatives

in Phase(s):

2–3
2
2–3
3–4
4

Support roles include assisting in:

- ☹ Public education and outreach
- ☹ Targeting management efforts among priority watersheds
- ☹ Preparation of work plans for CWA §319 grants when appropriate

in Phase(s):

3–5
3–4
4

Other Partners

Regional CRP contractors and the EPA are the other key partners in initial implementation of the watershed management approach, and their roles are described in this section. Additional partnerships with other state, federal, and non-governmental organizations are likely to emerge as a result of the watershed management approach.

Regional Agencies

The TNRCC contracts with existing regional agencies, such as selected river authorities, councils of government, and water utility districts, to implement key components of the CRP. The statewide watershed management approach continues and strengthens this partnership with the CRP contractors. The primary contributions provided by the regional agencies will be the monitoring of water quality and the coordination of public participation throughout each river basin. The CRP will adjust its previous approach of conducting the same activities in all basins simultaneously, to a staggered approach that coincides with the statewide basin management schedule.

Lead roles include:

- ☹ Conducting local outreach
- ☹ Establishing and maintaining basin steering committees, administering and hosting basin steering committee meetings and public participation forums
- ☹ Preparing quality assurance project plan(s)
- ☹ Preparing watershed monitoring plans; fixed-station ambient, systematic watershed, and targeted in response to monitoring objectives established by SWQM and Field Operations
- ☹ Data collection and management (e.g., SWQM database)
- ☹ Assessing water quality data and conditions to help establish watershed priorities
- ☹ Documenting summary reports of special studies from targeted monitoring
- ☹ Monitoring and assessing the effectiveness of watershed action plans

in Phases:

1–5
1–5
1
1
1–3
1,3
4
1–2

Support roles include assisting in:

- ☹ Data collection for intensive surveys, special studies, and receiving water assessments, and strategic watershed monitoring
- ☹ Deliberations of point and nonpoint source pollution load reductions and management decisions
- ☹ Determination of the effectiveness of alternative management strategies

in Phases:

2–3
3–4
2–4

U.S. Environmental Protection Agency

A number of opportunities exist for improving coordination and efficiency between the TNRCC and the EPA. For example some of the roles and responsibilities the EPA could adopt in support of the watershed management framework include:

- 💧 Promoting the watershed management approach through EPA-sponsored activities
- 💧 Adjusting operating procedures under certain provisions of the CWA [e.g., §§305 (b), 303(d), 319] to accommodate the TNRCC's movement to a watershed-based, five-year cycle
- 💧 Targeting training and technical support to coincide with statewide watershed management schedule where appropriate
- 💧 Supporting the TNRCC's segment ranking and prioritization process
- 💧 Supporting watershed action plan adoption through participation at steering committee meetings and stakeholder outreach
- 💧 Using TNRCC recommendations and priorities to guide funding decisions, technical assistance and watershed outreach activities
- 💧 Facilitating permitting issuance according to the watershed management cycle
- 💧 Verifying the effectiveness of state and local programs
- 💧 Providing for compilation and dissemination of successful programs and management practices from all states
- 💧 Demonstrating and evaluating best management practices
- 💧 Assessing and compiling data, and incorporating it into GIS format for use at state, regional, and local levels
- 💧 Implementing pretreatment programs where needed

These roles can be assumed at various points in the basin management cycle.

The watershed management framework is designed to provide opportunities for information transfer and partner involvement at key points during the five-phase basin management cycle. However, as partnerships expand, sharing resources and distributing work loads among participants should be emphasized to prevent overloading the basin coordinators and OWRM staff with those tasks associated with coordination. The TNRCC will encourage such partnerships and collaborate with other interested partners as appropriate. Mechanisms for cooperative working arrangements will vary by basin and over time based on the number of partners that are willing and able to work together and the water quality concerns they address.

Integration and Sequencing of Program Activities

Initial implementation of the watershed management approach will be driven by the OWRM's commitment to coordinate programs through the basin management cycle. Table 5-1 outlines in detail the activities, outputs, responsible programs, and anticipated timing for each of the 10 tasks in the five phases of the basin management cycle. As an example, Table 5-1 focuses on Group A basins for each of the five phases. The same activities, outputs, responsible programs, and timing will be required for each of the other basin groups in subsequent years based on the statewide schedule. Initial stakeholder meetings will be held primarily in basin Groups A, C, and E during fiscal year 1997 to inform stakeholders about the basin management cycle and schedule and to seek input on upcoming activities in those basins.

Table 5-1. Sequence of Program Activities

Acronyms:

BEAT	Border Environmental Assessment Team	SWQM	Surface Water Quality Monitoring
CRP	Clean Rivers Program	SWQS	Surface Water Quality Standards
CRPT	Clean Rivers Program Team (Watershed Management Team)	WWPS	Wastewater Permit Section
NPST	Nonpoint Source Team		

Phase 1: SCOPING AND RE-EVALUATION (Months 1–12)			
Activity	Output	Responsibility	Est. Time Frame
INITIATE PUBLIC OUTREACH AND EDUCATION			
Prepare for initial basin steering committee meetings in Group A basins 1. Watershed coordinator prepares presentation materials for explanation of watershed management approach for Group A basins 2. CRPT collaborates with CRP contractors to organize steering committees 3. CRPT and Modeling prepare presentation to communicate the results of the §303(d) list—ranking, rationale, and methodology used to rank watersheds (segments) for Group A basins 4. CRPT prepares a presentation to summarize the need for and importance of the data that are to be collected by local stakeholders to support strategy development 5. SWQM, Field Operations, and Texas Watch prepare presentation on statewide and basin-specific monitoring objectives 6. NPST prepares presentation on NPS objectives and issues in Group A basins	Presentation materials on general overview of the statewide approach, basin management cycle, outcomes of strategy development, and value of public participation Meeting agendas, expanded steering committee rosters, meeting notices Ranked listing of impaired water bodies for all Group A basins requiring TMDLs [i.e., §303(d) list]; matrix of permittee locations, parameters, and flows for dischargers in Group A basins Presentation materials on purpose of monitoring plans, monitoring plan guidance, targeted monitoring guidance, existing monitoring station locations, QAPP guidance, summary of how data will be used to support regulatory and nonregulatory decisions Presentation materials on timing of statewide §305(b) report, NPS assessment report, statewide ambient and basin-specific targeted monitoring objectives, QAPPs Presentation materials on nonpoint source pollution objectives and issues in basin; subset of ranked list [i.e., §303(d) list] of priority water bodies in Group A basins where nonpoint source impacts contribute to impairments or are otherwise of concern.	Basin coordinator CRPT, BEAT CRPT, Modeling, Toxicity Evaluation CRPT, Modeling, SWQM, BEAT SWQM, Texas Watch, Field Operations NPST	Month 1

Activity	Output	Responsibility	Est. Time Frame
7. SWQS prepares presentation on proposed areas for standards review, and NPDES permits in need of receiving water assessments	List of water bodies where water quality standards may need to be revised and wastewater permits in need of receiving water assessments	SWQS, SWQM, CRPT	
8. Prepare presentation materials to describe data necessary to determine critical flows, chronic toxicity criteria, and mixing conditions for development of water-quality-based permit limits	Presentation materials to educate stakeholders on how to support data collection needs to support wastewater permitting	Toxicity Evaluation	
Participate in basin steering committee meeting #1 for Group A basins			
1. Water Planning and Assessment Division programs conduct outreach through presentations	Orientation for basin steering committee to five-phase approach (focus on how process supports strategy development)	Team leaders assign staff to cover multiple basin steering committee meetings	Month 2
2. Facilitate discussion to receive input on watersheds, in addition to those on the §303(d) list, that should be recognized as local priorities; establish list of priority watersheds for strategy development	Feedback on basin goals and priorities for monitoring, watersheds targeted for management solutions, standards review, currently unclassified streams, public support for priority watersheds (subset of segments where both point and nonpoint source impacts are known), and other miscellaneous watershed issues; list of parties capable of supporting point and nonpoint source monitoring and data collection Feedback on proposed next steps of cycle and level of basin steering committee participation Schedule for next basin steering committee meeting	CRPT, Modeling, SWQM, SWQS, Texas Watch, Toxicity Evaluation, NPST, BEAT, basin coordinator, Field Operations	
Continue outreach and education efforts throughout Group A basins to communicate watershed management concepts and schedule of watershed management activities	Flyers, brochures, basin steering committee meeting notices, public service announcements, newsletters	CRPT, Texas Watch, basin coordinator, NPST	Months 3–5

Activity	Output	Responsibility	Est. Time Frame
ESTABLISH BASIN GOALS AND PRIORITIES AND DEVELOP MONITORING PLANS			
Water Planning and Assessment Division coordinates with CRP contractors and other interested entities to develop strategic data collection and monitoring plans for point and nonpoint source pollutants and QAPPs for Group A basins and identify gaps in existing data	Plans for intensive surveys, special studies, receiving water assessments, use attainability analysis, CRP systematic monitoring, CRP targeted monitoring, Texas Watch volunteer monitoring Guidance for QAPPs to interested parties Guidance and standard forms for nonpoint source pollution data collection	SWQM, CRPT, Texas Watch, NPST Team, SWQS, Toxicity Evaluation, BEAT, Ecosystem Research, Field Operations	Months 2–7
Rank Group A basins to set priorities for conducting basin hydrologic models to estimate naturalized base flows for TMDL development or nonpoint source loading estimates	Priority list, list of criteria used to rank basins, list of hydrologic modeling partners to assist effort	Ecosystem Research, Modeling, NPST	Month 6
Conduct key public outreach activities in Group A basins 1. Participate in workshops, use mailings, bulletin board systems and conferences to initiate NPS assessment report and management program update process; publish notice; provide technical assistance and educate public with special emphasis on Group A basins 2. Conduct two regional workshops in Group A basins to inform participants and obtain input on basin priorities and volunteer monitoring plans	Workshops, mailings, bulletin board, Internet home page, presentations Recommendations for participants, monitoring training, monitoring sites Texas Watch recommendations on basin goals, priorities and citizen monitoring	NPST, CRPT, BEAT, Field Operations Texas Watch	Months 6–10

Activity	Output	Responsibility	Est. Time Frame
Participate in basin steering committee meeting #2			Month 10
1. Summarize proposed ambient and targeted monitoring plans and responsibilities for Group A basins to raise awareness about monitoring objectives	Recommendations from basin steering committee and CRP contractors for revisions to monitoring plans and QAPP; final list of priority watersheds targeted for strategy development	CRPT, SWQM, NPST, BEAT, basin coordinator, Field Operations	
2. Identify methods for expanding public participation in specific watersheds slated for strategy development in Group A basins; identify stakeholders at the local level who are responsible and interested in supporting the watershed management cycle	Recommendations to CRP contractors for recruitment of individuals or leaders to participate in strategy development in priority watersheds; CRP contractors' charge is to establish local watershed advisory groups to begin identifying potential management options for priority watersheds	CRPT, CRP contractors, NPST, BEAT, basin coordinator	
3. Summarize guidance to acquire local involvement in data collection to support TMDL development which affects standards, permitting, and nonpoint source grant decisions	List of other entities within priority watersheds who can assist and support upcoming data collection and assessment activities in Group A basins	CRPT, Modeling, CRP contractors, NPST, BEAT, basin coordinator, Field Operations	

Phase 2: DATA COLLECTION (Months 12–36)			
Activity	Output	Responsibility	Est. Time Frame
IMPLEMENT STRATEGIC DATA COLLECTION AND MONITORING PLANS			
Implement point and nonpoint source strategic data collection and monitoring plans in Group A basins			Months 13–36
1. Targeted point and nonpoint source data collection and monitoring to support development of TMDLs for priority watersheds in Group A basins	Sampling and information collection for receiving water assessments, use attainability analysis, unclassified streams, standards revisions, intensive surveys, special studies, instream use assessments, flow estimation	SWQM, Standards, Ecosystem Research, NPST, Field Operations, CRP contractors	
2. Collect baseline watershed data and information necessary to support TMDL analyses and compliance activities in Group A basins	Nonpoint source assessment report, §305(b) report, CRP contractor assessment reports, volunteer monitoring data, reports on special studies, precipitation records		

Activity	Output	Responsibility	Est. Time Frame
Obtain information from local stakeholders on existing protection measures in priority watersheds	Local data and information which can influence management strategies (e.g., zoning ordinances, stormwater controls, riparian easements, etc.)	CRPT, NPST, CRP contractors, BEAT	Months 12–24
COMPILE AND MAINTAIN DETAILED INFORMATION AND DATA			
Initiate contracts for basin hydrologic modeling where appropriate in Group A basins	Model and data for estimating naturalized base flows in a basin	Ecosystem Research	Months 15–24
Teams compile water quality data and information collected by different monitoring partners; conduct QA/QC procedures on all data and information received	Surface water quality data that have received QA/QC review for Group A basins	SWQM, NPST, CRPT, BEAT, Field Operations	Months 24–36
Input appropriate data and information into acceptable format for SWQM databases	Reports, data tables, SWQM data base for CWA §305(b) report, NPS assessment report, TRACS, CRP contractor database, Texas Watch volunteer monitoring data	SWQM, CRPT, NPST, Texas Watch, Field Operations	Months 18 and 24
Participate in basin steering committee meeting #3 to summarize the progress and results of data collection	Feedback from steering committee members on monitoring results, severity of impact for known pollutants in priority watersheds	Team leaders assign staff to cover multiple basin steering committee meetings	Months 18–21

Phase 3: ASSESSMENT AND TARGETING (Months 18–42)			
Activity	Output	Responsibility	Est. Time Frame
ANALYZE AND EVALUATE INFORMATION AND DATA			
STNRCC programs conduct data analysis and document results			
1. SWQM Team conducts assessment of field data to provide supporting information for model and standards development	Data tables and special studies reports to Modeling and SWQS	SWQM	Months 18–26
2. NPST coordinates the preparation of the NPS assessment report based on SWQM technical analysis of field data and input from interested parties	Draft NPS assessment report; update NPS management program for Group A basins	SWQM, NPST	Months 17–33

Activity	Output	Responsibility	Est. Time Frame
3. Receiving water assessments to classify unclassified segments for establishing standards and criteria for permit effluent limits	Designation of use for unclassified water bodies, and eventual establishment of water quality standards	CRPT, SWQS, Field Operations	Months 28–32
4. Texas Watch Team evaluates citizen monitoring data to be used as screening information for future SWQM and CRP targeted monitoring activities	Texas Watch Annual Volunteer Monitoring Report, data files	Texas Watch, SWQM	Months 30–36
5. Use attainability analysis to re-evaluate the designated use of a classified water body to allow an alternative designated use	Targeted assessment for proposed change in water quality standard, where appropriate	SWQS, Modeling, SWQM	Months 28–32
6. Instream use assessments to determine lowest flow necessary to protect aquatic life	Support information for receiving water assessments	Ecosystem Research	Months 28–32
Propose classification and applicable standards for targeted waters, complete assessment of degradation potential to meet antidegradation requirements of CWA	Proposed classification(s) and applicable standards; written findings for degradation potential	SWQS	Months 30–32
Analyze status and trends data within the basin to identify any additional issues not recognized as priorities in Phase 1 that can be addressed during the strategy development phase in Group A basins	Summary information for §305(b) report section(s); support information for priority issues in watershed action plan section(s)	Modeling, SWQM, CRPT, NPST	Months 28–36
QUANTIFY IMPACTS/SOURCES AND RANK WATERSHEDS			
Apply models to support TMDL development, evaluation of pollution impacts, and establishment of pollutant reduction goals	TMDLs, technical reports, watershed action plan section(s)	Modeling, NPST, Ecosystem Research	Months 24–40
Summarize and distribute results of basin hydrologic models for TMDL development and nonpoint source loading estimates	Update basin hydrologic models	Ecosystem Research	Month 28
Participate in basin steering committee meeting #4 to summarize the results of assessments	Feedback from steering committee members on monitoring and modeling results, severity of impact for known pollutants in priority watersheds; identify preliminary management options for priority watersheds	Team leaders assign staff to cover multiple basin steering committee meetings	Month 30

Activity	Output	Responsibility	Est. Time Frame
CRP contractors prepare basin assessment reports 1. Conduct assessment to determine status of water quality in segments 2. Compare those findings to the existing set of priority watersheds where detailed assessments have been performed 3. Identify new areas within Group A basins that could be addressed immediately during strategy development phase and recommend management strategies for steering committee review and comment	Basin assessment reports	CRP contractors, CRPT	Months 34–36
Begin preparing draft of water quality assessment to evaluate trends of concern, and causes and sources of impairments for inclusion into the §305 (b) report	§305(b) report sections	CRP contractors, SWQM, CRPT, BEAT	Months 37–47

Phase 4: STRATEGY DEVELOPMENT (Months 36–48)			
Activity	Output	Responsibility	Est. Time Frame
DEVELOP MANAGEMENT STRATEGIES FOR PRIORITY WATERSHEDS			
Develop draft wasteload allocation based on TMDLs for priority watersheds in Group A basins	Draft wasteload allocation recommendations	Modeling, SWQS, Toxicity Evaluation	Months 36–38
Participate in basin steering committee meeting #5	Feedback from stakeholders on proposed point and nonpoint source load reductions and preliminary management options, parties responsible for implementation of management strategies, identification of funding sources and leveraging opportunities	Team leaders assign staff to cover multiple basin steering committee meetings	Month 37
Distribute load reductions between point and nonpoint sources for priority watersheds	Target reductions for point and nonpoint sources	NPST, Modeling, Toxicity Evaluation	Month 37
Work with potential §319 grant recipients in priority watersheds to negotiate work plans that achieve targeted nonpoint source loading reductions	Draft §319 work plans for current year funding	NPST, BEAT, basin coordinator, CRP contractors	Months 37–40

Activity	Output	Responsibility	Est. Time Frame
Collaborate to determine appropriate permit conditions to meet antidegradation requirements	Draft wastewater permit effluent limitations and conditions	SWQS, WWPS	Months 42–48
NPST coordinates an update of the NPS management program based on new assessment information and management initiatives	Update NPS management program	NPST	Months 42–48
DOCUMENT MANAGEMENT STRATEGIES AND RECOMMENDATIONS			
Compile information for watershed action plans 1. Nonpoint source and point source load reduction goals 2. TMDL(s) 3. NPS watershed work plans 4. Wastewater wasteload allocation and key permit conditions 5. Recommendation for evaluating effectiveness of management strategies 6. Identification and recommendations for stream classification and proposed water quality standards 7. Recommendations for future monitoring and addressing information gaps 8. Additional local watershed protection plans (optional)	Draft watershed action plan for priority watersheds in Group A basins	NPST, CRPT, BEAT, basin coordinator Modeling, toxicity evaluation, SWQS, SWQM, basin coordinator, CRP contractors	Months 42–48
Participate in basin steering committee meeting #6	Comments and recommendations on revisions to watershed action plans	Team leaders assign staff to cover multiple basin steering committee meetings	Month 47
Complete §305(b) report for establishment of priorities in next iteration of basin management cycle	§305(b) report, which incorporates NPS assessment report and river basin assessments; watershed analysis for the EPA (Water Body System)	SWQM	Month 47

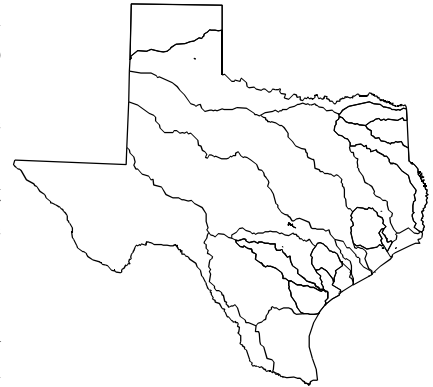
Phase 5: IMPLEMENTATION (Months 48–60)			
Activity	Output	Responsibility	Est. Time Frame
FINALIZE WATERSHED ACTION PLANS			
Begin preparing draft of water quality assessment to evaluate trends of concern, and causes and sources of impairments for inclusion into the §305 (b) report	§305(b) report sections	CRP contractors, SWQM, CRPT, BEAT	Months 49–52
Begin permit application review for those renewals and amendments which are administratively complete	Draft wastewater permits	WWPS, SWQS	Months 49–56
Participate in basin steering committee meeting #7 to initiate strategy implementation	Adopted watershed action plans	Team leaders assign staff to cover multiple basin steering committee meetings	Month 52
Prepare draft §303(d) list	Draft §303(d) list	Modeling	Month 49
IMPLEMENT WATERSHED MANAGEMENT STRATEGIES			
Issuance of final domestic and industrial permits	Wastewater permits	WWPS	Months 52–60
Implement §319 work plans for nonpoint source projects in priority watersheds	§319 funding awards, contracts; implementation of best management practices	NPST, CRPT	Month 54
Revise or establish SWQS or new criteria	Public notices, hearings, adoption of standards, revision of written regulations	SWQS	Months 56–60
Conduct outreach efforts to disseminate watershed action plans	Meetings, presentations, mailings, Internet home page	CRPT, Texas Watch, NPST	Months 56–58
Monitor and assess implementation of watershed action plans and report back to the TNRCC	Status reports	CRP contractors, CRPT, basin coordinator	Month 60

Chapter 6

Transition to Implementation

Schedule for Framework Implementation

Successful implementation of the statewide watershed management approach will require coordination between OWRM programs and various stakeholders. To effectively incorporate the framework for watershed management into their day-to-day activities, OWRM water quality management program staff must achieve a thorough understanding of this guidance document. OWRM managers established a specific schedule of tasks to be undertaken in fiscal year 1997 that will ensure full understanding and subsequent implementation of this guidance document.



1. Team leaders and section managers of the Water Planning and Assessment Division, the Wastewater Permits Section, OWRM division directors, and the Water Policy Division reviewed and commented on the draft guidance document from September 1 through October 31, 1996. Individual meetings were held with the various team leaders of the programs identified in Chapter 5 to discuss the implications of the guidance document in detail.
2. EPA staff also reviewed and commented on the draft guidance document from September 1 through October 31, 1996.
3. Meetings were held in January 1997 to obtain feedback and further support for the statewide approach from the TNRCC commissioners and executive director.
4. During the month of December 1996, the guidance document was revised to incorporate comments from TNRCC and EPA staff. Based on these comments, TNRCC management will meet with the EPA in April 1997 to finalize agreements for those operating procedures which will be adopted by the EPA in support of the watershed management approach.

These tasks are aimed at ensuring that OWRM management and staff, as well as EPA staff, have a thorough understanding of the requirements and expectations associated with the watershed management approach. To fully incorporate the guidance of this document into the agency culture, the TNRCC will revise existing standard operating procedures and program work plans, which are the basis for allocation of technical and administrative staff resources and funding within the commission. Consequently, the OWRM will select a small work group to initiate and complete two critical tasks to ensure that the guidance document is incorporated into day-to-day operating procedures.

1. The OWRM will adopt revised standard operating procedures by December 1997.
2. Participating OWRM programs will adjust existing work plans for fiscal years 1998 and 1999 to address activities included in the basin management schedule.

Adjusting existing work plans for fiscal year 1998 and beyond will require each OWRM team to determine the appropriate level of effort and resources to commit in support of the watershed management approach. A percentage of time and resources would also be reserved by each OWRM team to address issues and needs outside of the basin groups being targeted in any given year. OWRM division directors, section managers, and basin coordinators will assist team leaders during the decision-making process as teams prepare their work plans.

Figure 6-1. Implementation of the Statewide Basin Management Schedule

River Basins*	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003
GROUP A: Canadian River, Red River, Sulphur River, Cypress Creek, Sabine River, Sabine Pass, Neches River & Trinity River	IMPLEMENTATION	SCOPING					SCOPING	
		DATA COLLECTION			BASELINE MONITORING		DATA COLLECTION	
			ASSESSMENT & TARGETING					
				STRATEGY DEVELOPMENT				
						IMPLEMENTATION		
GROUP B: Trinity River (continued) San Jacinto River		IMPLEMENTATION	SCOPING					SCOPING
		BASELINE MON.	DATA COLLECTION			BASELINE MONITORING		DATA COLL.
				ASSESSMENT & TARGETING				
					STRATEGY DEVELOPMENT			
							IMPLEMENTATION	
GROUP C: San Jacinto River (cont.) San Jacinto–Brazos Coastal, Neches–Trinity Coastal, Trinity–San Jacinto Coastal, Bays & Estuaries			IMPLEMENTATION	SCOPING				
		BASELINE MONITORING			DATA COLLECTION		BASELINE MONITORING	
					ASSESSMENT & TARGETING			
						STRATEGY DEVELOPMENT		
								IMPLEMENTATION
GROUP D: Brazos River, Brazos–Colorado Coastal, Lavaca River, Colorado River, Bays & Estuaries		ASSESS & TARGET	STRATEGY DEV.	IMPLEMENTATION	SCOPING			
		BASELINE MONITORING			DATA COLLECTION			BASELINE MON.
						ASSESSMENT & TARGETING		
								STRATEGY DEV.
GROUP E: Colorado (cont.), Guadalupe, San Antonio, Nueces & Rio Grande Rivers, San Antonio–Nueces Coastal, Colorado–Lavaca Coastal, Lavaca–Guadalupe Coastal, Nueces–Rio Grande Coastal, Bays & Estuaries, Gulf of Mexico						SCOPING		
		DATA COLLECTION			BASELINE MONITORING		DATA COLLECTION	
			ASSESSMENT & TARGETING					ASSESS & TARGET
				STRATEGY DEVELOPMENT				
					IMPLEMENTATION			

*Note: Chronological order of river basins is derived from the Title 30 Texas Administrative Code § 305.71 Permit-by-Basin rule. Wastewater permits for each group of basins are issued to coincide with the implementation phase.

Entering the Statewide Basin Management Schedule

Sequencing the day-to-day activities of participating TNRCC programs to be synchronized with the statewide basin management schedule will require a gradual transition (see Figure 6-1). The TNRCC will initiate activities in fiscal year 1997 for Basin Groups A, C, and E. Basin Group B will be phased in during fiscal year 1998, Basin Group C in fiscal year 1999, and Basin Group D in fiscal year 2000. TNRCC program operations supporting the watershed framework will be reduced in Basin Groups C and D over the next three years to ongoing activities (i.e., technical assistance and implementation activities not tied to the basin management cycle schedule), providing staff with more time to begin focusing certain activities (e.g., strategic monitoring, CWA §305(b) assessment, NPS program update, modeling, and action plan development) within a limited number of basins. Schedules for phasing in activities over the next three fiscal years are summarized below by basin group.

Fiscal Year 1997

- 💧 *Basin Group A:* Activities will begin with the scoping phase. Initial steps will involve the preparation of a comprehensive water quality monitoring strategy to address §303(d) listed waters within Group A basins, and preparing for basin steering committee meetings to discuss priorities for watershed action plan development and to obtain input on strategic data collection and monitoring needs. The comprehensive water quality monitoring strategy will be developed through a coordinated effort involving the basin coordinator, SWQM Team, Field Operations Division, Texas Watch, the Clean Rivers Program Team, Water Quality Standards Team, and the Toxicity Evaluation Team.
- 💧 *Basin Group C:* Activities will begin in the strategy development phase of the cycle. Based on previous basin assessments, the OWRM will work with the basin steering committees to select a few priority watersheds suitable for action plan implementation. Specifically, the OWRM and CRP contractors will recruit local stakeholders interested in obtaining CWA §319 grant funds for implementing nonpoint source management projects in priority watersheds. TMDLs for certain metals will also be completed for priority watersheds in Group C. These efforts will be limited in number and scope for the first iteration of the cycle, because strategic monitoring to fill information gaps and to support management TMDL modeling will not have been performed. However, the reduced scale is probably wise from a management perspective, given that this will be the first time that priority watershed action plans are developed. The Nonpoint Source Program, SWQM, Modeling, and CRP Teams will have the primary responsibility for implementing these tasks in Group C basins.
- 💧 *Basin Group E:* Activities will begin in the strategic data collection and monitoring phase of the cycle. Although strategic monitoring plans will not have been formally reviewed by basin committees (i.e., through a scoping phase), refinements to traditional monitoring programs for the OWRM have already been put in place by the SWQM Team, such that fiscal year 1997 monitoring activities will focus on Group E basins. Thus, participants will be able to take advantage of additional information going into the assessment and targeting phase to support priority watershed action plan development.

Fiscal Year 1998

- 💧 *Basin Group B:* Activities will begin with the scoping phase of the cycle. The statewide §303(d) list prepared in fiscal year 1997 will be used to establish priorities. A comprehensive water quality monitoring strategy to address §303(d) listed waters within Group B basins will be presented to the basin steering committee to reach consensus on priorities for watershed action plan development and to obtain input on strategic data collection and monitoring needs.
- 💧 *Basin Groups A, C, and E:* Activities continue according to schedule. Staff support strategic data collection and monitoring for Basin Group A; issuance of wastewater permits and awarding CWA §319 grant funds is the focus for Basin Group C; and data collection continues, and assessment and targeting begin, for Basin Group E.

Fiscal Year 1999

- 💧 *Basin Group C:* Activities will begin with the scoping phase of the cycle. The §303(d) list will need to be

updated for this basin group in late fiscal year 1998 to establish priorities for monitoring, TMDL development, and strategy development during the next five-year cycle.

- 💧 *Basin Groups A, B, and E:* Activities continue according to schedule. Data collection continues, and assessment and targeting begin for Basin Group A. Staff support strategic data collection and monitoring for Basin Group B, and strategy development is the focus for Basin Group E.
- 💧 *Basin Group D:* Implementation is scheduled for Group D, and the primary activity will involve the issuance of wastewater permits and the potential awarding of CWA §319 grant funds.

Fiscal Year 2000

- 💧 *Basin Group D:* Activities will begin with the scoping phase of the cycle. The §303(d) list will need to be updated for this basin group in late fiscal year 1999 to establish priorities for monitoring, TMDL development, and strategy development during the next five year cycle. With all phases being activated in 2000, this year will mark the first year of complete implementation of the approach statewide.
- 💧 *Basin Groups A, B, C, and E:* Activities continue according to schedule. Strategy development is initiated in Basin Group A to establish pollution control responsibilities and reduction goals for priority watersheds. Data collection and special studies are being completed, and assessment and targeting begin for Basin Group B. Staff support strategic data collection and monitoring for Basin Group C, and implementation is the focus for Basin Group E.

These summaries are intended to give OWRM staff a quick overview of how implementation will proceed. Details regarding specific activities and schedules can be found in Table 5-1 . Program activity worksheets have been developed to help programs establish work plans for upcoming fiscal years.

Additional Elements Necessary for Framework Refinement

In addition to revising operating procedures and program work plans, there are a number of other key elements which the OWRM will need to prepare to fully implement the statewide watershed management approach.

TNRCC Rules and Guidance

1. The CRP Team and BEAT will collaborate with the basin coordinator and other OWRM teams, where appropriate, to prepare new guidance manuals covering all five phases for CRP contractors. The CRP Team will work closely with CRP contractors to obtain their input and build a strong understanding of the new guidance. The guidance will list specific tasks, roles, responsibilities, schedules, and outcomes associated with each phase of the basin management cycle (April 1997).
2. TNRCC rules and corresponding guidance will be prepared by CRP staff to revise rosters, functions, roles, and responsibilities for basin steering committees and priority watershed subcommittees. Public input will be sought during the development of the rule package and subsequent guidance (June 1997).
3. TNRCC rules and corresponding guidance will be prepared by CRP staff to revise the current reporting requirements under the CRP. Rules and guidance will outline specific responsibilities of the CRP contractors, basin steering committees, and priority watershed subcommittees as they pertain to the documentation of water quality assessments, strategy development through watershed action plans, and fiscal reporting. The recommended format and content of the different reports required will be included in the rules and guidance (June 1997).
4. The Modeling Team will collaborate with other OWRM teams to prepare guidance and quality assurance/quality control procedures for water quality modeling completed by organizations outside the TNRCC. The guidance and QA/QC protocols will be developed to ensure that modeling efforts conducted by

any organization outside the TNRCC will be scientifically valid and can support the future development of TMDLs for specified water bodies (July 1997).

Operating Agreements

1. The TNRCC will meet with and request formal written agreements from the EPA for changes to operating procedures associated with specific CWA reporting requirements. The specific details of TNRCC's proposed changes to reporting requirements are summarized later in this chapter (April 1997).
2. The TNRCC will initiate discussions with the EPA to alter the traditional linear approach to administering and implementing its CWA §319 Nonpoint Source Program. Historically, this program has required that projects adhere to a linear sequence of tasks:
 - 💧 installation of a best management practice (BMP)
 - 💧 operation and maintenance of the BMP
 - 💧 monitoring the effectiveness of the BMP

Specifically, the commission will begin to allocate §319 funds on a negotiated process that targets priority watersheds in specific basins as determined by the basin management schedule. Negotiated work plans would lead to funding projects for one- or two-year periods rather than for three to five years. In other words, in one year §319 funds could be used to support assessment activities in one group of basins, or implementation of BMPs in another. The TNRCC will request that nonpoint source assessment activities conducted in one group of basins by CRP contractors be recognized as matching effort for the award of §319 implementation funds committed to another group of basins. The commission will also request changes to the requirements for a formal public review and comment period associated with updating the NPS assessment report. It is expected that this requirement can be fulfilled through the expanded role the CRP basin steering committees will play throughout the phases of the basin management cycle. These changes are necessary to more effectively support the timing and geographic focus of the TNRCC statewide basin management schedule (December 1996).

3. A major task for OWRM staff is to establish a consistent process for selecting priority watersheds. Priority watersheds are those which will be targeted for the development and implementation of TMDLs or other management strategies. To complete this task, OWRM staff will refine the existing CRP process for ranking water bodies and the TNRCC's process for preparing the §303(d) list. The SWQM, CRP, NPS, Standards, Modeling, Ecosystem Research, Border Environmental Assessment, and Toxicity Evaluation Teams will develop a list of criteria and the rationale for the selection of priority watersheds for each group of basins. The selection of the priority watersheds for each group of basins will be based on the §305(b) Report, including the interim NPS assessment section, the Clean Rivers program summary reports, and the §303(d) list derived from these reports. Because the TNRCC and participants in the CRP do not have the resources to address each water quality issue in every river basin, a consistent process must be established for selecting specific watersheds within a group of basins (March 1997).

Research

Currently, the OWRM is administering an EPA grant to evaluate and establish an effective methodology for delineating geographic units, or watersheds, for every river and coastal basin in Texas. The project will test the methodology in three different basins and will result in the development a software system to assist water resource managers in tracking watershed-based projects, funding, and water quality improvements. Over the next two-year period, this project will provide important support features to the watershed management approach (September 1997).

Support Structure Components

The implementation of the support structures summarized in Chapter 4—basin coordinators, basin steering committees, priority watershed subcommittees, and information management—will require significant commitments on behalf of the TNRCC. The extent of these commitments will unfold over the next 12 to 18 months as the OWRM addresses the following issues and tasks.

Basin Coordinators

The establishment of basin coordinator positions will be evaluated by TNRCC management during fiscal year 1997. Based on discussions to date, six positions are recommended to support the extensive and ongoing coordination among teams and stakeholders. Five positions would be used for basin coordinators, and one position will provide administrative support to the coordinators. The positions could be phased in over the next three years as the statewide schedule is implemented. Two coordinators and one administrative assistant will be needed in fiscal year 1998, two more coordinators in fiscal year 1999, and one more coordinator in 2000. The positions could be newly established positions or existing positions reassigned to handle new duties that support the watershed management approach. These positions will require individuals with a broad range of knowledge and experience in water quality programs, management, and dispute resolution. Establishing the positions at a state grade of 19/1 or greater is recommended to attract qualified staff. A portion of the funding necessary to support these positions would most likely come from CWA §104(b)(3) grants.

Basin Steering Committees

The additional roles and responsibilities that will be adopted by the basin steering committees will evolve through a series of meetings with the CRP contractors and a select group of existing basin steering committees throughout fiscal year 1997. As outlined in Table 6-1, the TNRCC will work to develop rules and corresponding guidance to strengthen the roles and responsibilities of basin steering committees.

Priority Watershed Subcommittees

The TNRCC recognizes the importance and benefits of establishing an effective forum for increasing public involvement throughout the basin management cycle. The establishment of priority watershed subcommittees will be an evolving process, which will vary from basin to basin. The OWRM will target Group E basins to begin formulating the guidance associated with the recruitment, administration, and responsibilities of the priority watershed subcommittees. Since the success of priority watershed subcommittees will depend largely on local interest in water quality issues, the OWRM will work closely with the existing basin steering committees of Group E basins to select a watershed(s) that could serve as an effective test for strengthening local participation. The planning and outreach efforts associated with the development of priority watershed subcommittees will begin in June 1997.

Information Management

Refinement of operating procedures to support data management and GIS applications for the watershed management approach will also need to occur in fiscal year 1997. It is recommended that an internal work group be formed to address the following key issues.

1. Evaluate how existing information management systems and capabilities will meet identified information management needs, and note where gaps in support capabilities exist. (Information from Figure 4-2 should be provided to the work group to help members understand support needs throughout the basin management cycle.)
2. Identify agency and partner lead and supporting roles and responsibilities to carry out the information management functions of the watershed management approach.
3. Provide recommendations for refinements of information management procedures within the OWRM to function accordingly.

Table 6-1. Additional Elements Necessary for Framework Refinement

Task	Anticipated
TNRCC RULES AND GUIDANCE	
1. OWRM preparation of new guidance manuals covering each of the five phases of the basin management cycle for review, comment, and implementation by the CRP contractors	April 1997
2. Development of TNRCC rules and corresponding guidance for roles and responsibilities of basin steering committees and priority watershed subcommittees	June 1997
3. Development of TNRCC rules and corresponding guidance to revise reporting requirements of the Clean Rivers Program	June 1997
4. Preparation of draft guidance and QA/QC protocols for water quality modeling completed by entities outside of the TNRCC to support TMDL development	July 1997
OPERATING AGREEMENTS	
1. TNRCC request and approval from EPA for changes to operating agreements associated with specific CWA reporting requirements.	April 1997
2. TNRCC will initiate discussions to seek approval from EPA for changes to the administration and implementation of the TNRCC Nonpoint Source Pollution Program in support of the watershed management approach	December 1996
3. OWRM refinement of the process and rationale for selecting priority watersheds based on the CWA §305(b) Report, Nonpoint Source Assessment Report, CRP assessment updates, and the §303(d) list	March 1997
RESEARCH	
OWRM coordination of a grant to develop and adopt a consistent methodology for delineating watersheds and the development of a software system to track watershed-based projects	September 1997
SUPPORT STRUCTURE COMPONENTS	
1. Evaluation by TNRCC management of need and responsibilities for basin coordinator positions to support the watershed management approach	June 1997
2. Development of TNRCC rules and corresponding guidance for roles and responsibilities of basin steering committees	June 1997
3. OWRM will target Group E basins to begin formulating the guidance associated with the recruitment, administration, and responsibilities of the priority watershed subcommittees	September 1997
4. Recommendations from OWRM internal work group on refinements to operating procedures for data management and GIS applications to support the watershed management approach	November 1997

Keys To Success

Leadership

Successful implementation of the watershed management approach will depend on the effectiveness and consistency of leadership throughout the five-phase cycle. With the adoption of the watershed management approach, the TNRCC seeks to evolve in its traditional role as regulator and enforcer. The TNRCC has, for the moment, assumed a leadership role in coordinating watershed management, overseeing the implementation of the basin management cycle, and synthesizing the strategy with the statewide schedule. OWRM division directors, basin coordinators, and staff of

participating programs will provide primary leadership by helping other parties interested in watershed management synchronize their activities with the basin management schedule.

Consistent and effective leadership is also essential at the regional and local level. Leadership responsibilities and functions will be a key requirement for basin steering committees and priority watershed subcommittees. The responsibilities and functions of basin steering committees and priority watershed subcommittees will be focused on providing public input in a timely fashion, strengthening participation, conducting efficient and effective meetings, and coordinating local outreach efforts. Recommendations will be made to ensure that individual priority watershed subcommittees establish a leadership structure and select a leader from within the community who has a stake in the outcome of the watershed action plan.

Commitment

The TNRCC's statewide watershed management approach is not mandated by statute or regulation. The long-term success of implementing the watershed management approach is derived from the TNRCC's commitment to the following tasks:

1. Incorporating the guidance summarized in this document through its standard operating procedures
2. Adjusting participating OWRM program work plans to accommodate the basin management cycle and the public input process
3. Developing TNRCC rules and guidance to coordinate the activities and outputs of the CRP contractors with the statewide basin management schedule
4. Developing TNRCC rules and guidance to refine the functions and responsibilities of basin steering committees and priority watershed subcommittees
5. Establishing six full-time employees as basin coordinators over the next four years

The TNRCC will also improve its ability to provide guidance and technical assistance to basin steering committees and priority watershed subcommittees. Agency budget allocations will, to the greatest extent possible, reflect priorities identified through the basin management cycle and public input received from the basin steering committees and priority watershed subcommittees.

Various commitments will also be necessary on the part of CRP contractors and the basin steering committees and priority watershed subcommittees. Participants on basin steering committees and priority watershed subcommittees serve both as representatives of their interest group or organization and partners in the development of basin and watershed plans. To support the decision-making process, participants must be empowered to make decisions on behalf of the interests they represent and to take those decisions back to their community, corporation, or government entity for implementation. The watershed management approach requires a commitment on the part of stakeholders to institute management strategies in a spirit of fairness and cooperation. Through collaboration between participants, lasting partnerships are built which focus on environmental results rather than individual program results.

Steering committee members represent diverse public and private interests. Meaningful participation on the steering committee requires stakeholders to speak on behalf of their community, agency, or firm at the negotiating table. Representatives must not only commit their time to the steering committee, but must be empowered by their organizations, both public and private, to commit the resources, information, expertise, and authority needed to develop and/or implement plans. Decisions based on consensus are made by the steering committee; therefore, stakeholder representatives must ensure that the group they represent will use their regulatory or management powers to abide by the agreements reached by the steering committee.

Adjusting Federal and State Reporting Requirements to Support the Statewide Watershed Management Approach

The watershed management approach provides the framework for day-to-day activities of participating OWRM programs to become more efficient over time. Reducing duplication among federal and state reporting requirements is an important objective for the OWRM. The OWRM will benefit through the consolidation of reporting requirements fostered by the watershed management approach.

Various phases of the watershed management approach will affect certain reporting requirements of current water quality management programs within the OWRM. Specifically, the five-phase approach will alter the traditional periods for publishing:

- 💧 *State of Texas Water Quality Inventory Report* [CWA §305(b) Report]
- 💧 CWA §303(d) List
- 💧 Nonpoint source assessment report [CWA §319]
- 💧 Nonpoint source management plan [CWA §319]
- 💧 Clean Rivers Program basin assessment reports
- 💧 TNRCC Clean Rivers Program water quality assessment summary report

The following section summarizes the proposed changes these specific documents will undergo, and Figure 6-2 shows the relationships in timing among the various reporting requirements discussed below. Each proposed change supports the goal of improving the administrative efficiency of the TNRCC's water resource programs. These proposed recommendations are currently pending formal approval at the federal and state level.

State of Texas Water Quality Inventory Report (CWA §305(b) Report)

Currently, the *State of Texas Water Quality Inventory* (CWA §305(b) report) is prepared by the SWQM Team and submitted to the EPA biennially in even-numbered years in accordance with §305(b). This report enables the public, local governments, state agencies, the Texas Legislature, the EPA, and Congress to evaluate water quality in Texas. Various changes to the future development of the document include:

- 💧 The *State of Texas Water Quality Inventory* will move from a two-year to a five-year reporting cycle, however, interim documentation will be prepared each year for specific groups of basins as determined by the statewide basin management schedule. The report will consolidate the nonpoint source pollution assessment report and the Clean Rivers Program assessment data. The interim documents will be completed near the end of Phase 5 to ensure their availability for setting priorities in Phase 1 for each group of basins. The SWQM Team will begin focusing on a single group of basins beginning with fiscal year 1997. After four consecutive years, the interim documents will be rolled into one statewide summary report for publication. The next statewide report will be published in March 2001.
- 💧 Although the purpose of the document remains the same, its content will be expanded to incorporate the nonpoint source assessment report, which has traditionally been prepared under separate cover. Coordination between the SWQM and Nonpoint Source Program Teams will be crucial during Phases 3 and 4 to ensure nonpoint source data and information are efficiently and accurately incorporated into the interim water quality inventory reports.

CWA §303(d) List

Currently, under CWA §303(d), the TNRCC is required to identify and set priorities for those water bodies requiring TMDLs every two years. Traditionally, the list has been prepared by the SWQM and Modeling Teams and submitted to the EPA biennially on even-numbered years. In previous years the list has been prepared as a statewide list and incorporated a numerical ranking to establish priorities among water bodies. Significant changes recommended for the future development of the §303(d) list include:

- 💧 The §303(d) list will change from a two-year, statewide list to an annual update on only a portion of the state. Beginning with fiscal year 1999, the §303(d) list will be updated in a portion of the state as determined by the basin management schedule. The list will be prepared during the implementation phase for each group of basins immediately following the §305(b) update. The interim lists will be completed near the end of Phase 5 to ensure its availability for setting priorities in Phase 1 for each group of basins. The list will no longer have numerical ranking and will be developed through a cooperative effort involving the SWQM, Modeling, NPS, CRP, and Standards Teams. Coordination with the EPA will be stressed throughout the development of the list and the public notification process.
- 💧 The purpose of the list will also change. The list will be used as a primary decision-making tool for water quality management by the TNRCC. The list will be used by the TNRCC to recommend priorities for future monitoring, TMDL development, intergovernmental coordination, and §319 nonpoint source management projects. Nonpoint source impacts to water bodies, which have traditionally been identified under the TNRCC's nonpoint source assessment report, will be identified in the §305(b) and on the §303(d) list. The identification and listing on the §303(d) list of water bodies affected by nonpoint source pollutants will allow the TNRCC and local organizations to target CWA §319 funds toward high-priority nonpoint source management projects. In subsequent years, the TNRCC will also coordinate with the EPA to establish practical procedures for adding water bodies to or deleting them from the §303(d) list.

Nonpoint Source Assessment Report

CWA§319 specified requirements for state nonpoint source pollution programs, including provisions for preparation and submittal of a nonpoint source pollution assessment report and a management program for the state. The statute and associated guidance specifies that the state's assessment report must identify waters that were degraded by nonpoint source pollution, and characterize the sources that contribute to those impacts. The management program represents the state's strategy for addressing the nonpoint source pollution impacts identified in the assessment report. Various changes to the future development of the document include the following:

- 💧 In the future, the statewide nonpoint source assessment report will be based on the same five-year reporting cycle that guides the *State of Texas Water Quality Inventory*. Interim documents will be prepared for specific groups of basins as determined by the statewide basin management schedule.
- 💧 The purpose of the document remains the same. Coordination between the SWQM and Nonpoint Source Program Teams will be crucial during Phases 3 and 4 to ensure nonpoint source data and information are formatted appropriately for incorporation into the interim water quality inventory reports.

Nonpoint Source Management Plan

Future development of the document will include the following:

- 💧 The statewide Nonpoint Source Management Plan will be based on the same five-year reporting cycle as the *State of Texas Water Quality Inventory*. Interim documents will be prepared for specific groups of basins as determined by the statewide basin management schedule. These interim documents will begin with fiscal year 1999, because a statewide nonpoint source management plan update will be published by the Nonpoint Source Program Team in fiscal year 1997.
- 💧 The purpose of the document remains the same. Coordination among the Modeling, Watershed Management, and Nonpoint Source Program Teams will be crucial during Phases 3 and 4 to ensure nonpoint source data and information supports the recommended management strategies identified in Phase 4 for priority watersheds.

Figure 6-2. Schedule for Reporting Requirements Under the Statewide Basin Management Schedule

BASINS	FY 1996	FY 1997 (Legislative Session)	FY 1998	FY 1999 (Legislative Session)	FY 2000	FY 2001 (Legislative Session)	FY 2002	FY 2003 (Legislative Session)	FY 2004	FY 2005 (Legislative Session)	FY 2006
Group A	Existing commitments	Prepare OWRM FY 1998-1999 work plan	Data Collection	Assessment	Strategy	Implementation	Scoping/	Data Collection	Assessment	Strategy	Implementation
Group B				Data Collection	Assessment	Strategy	Implementation	Scoping/	Data Collection	Assessment	Strategy
Group C					Data Collection	Assessment	Strategy	Implementation	Scoping/	Data Collection	Assessment
Group D		Existing commitments	Develop customized guidance between			Data Collection	Assessment	Strategy	Implementation	Scoping/	Data Collection
Group E			Assessment	Strategy	Implementation	Scoping/	Data Collection	Assessment	Strategy	Implementation	Scoping/
Statewide			Continued statewide baseline monitoring and ongoing implementation efforts								
CRP CONTRACTORS REPORTING		Last traditional two-year CRP		CRP Update to the Legislature		CRP Update to the Legislature		CRP Update to the Legislature		CRP Update to the Legislature	
Data to TNRCC			Semi-Annual Basin Electronic Reporting								
TNRCC REPORTING											
CWA 305(b)	Last traditional two-year State 305(b) Report	Last traditional CRP Statewide Summary Report				First five-year Combined State 305(b) (December)					Second five-year Combined State 305(b) (December)
303(d) list	New statewide list	Update statewide list	Update, priority to Group C	Update, priority to Group D	Update, priority to Group E	Update, priority to Group A	Update, priority to Group B	Update, priority to Group C	Update, priority to Group D	Update, priority to Group E	Update, priority to Group A
NPS Assessment Report		Update to the NPS Assessment Report	Update, priority to Group E	Update, priority to Group A	Update, priority to Group B	Five- year NPS Assessment Report (Combined with 305(b))	Update, priority to Group D	Update, priority to Group E	Update, priority to Group A	Update, priority to Group B	Second five-year NPS Assessment Report (Combined with 305(b))
Data to EPA			Semi-Annual Basin Electronic Reporting								
FUNDING											
	Statewide	Statewide	Priority to	Priority to	Priority to	Priority to	Priority to	Priority to	Priority to	Priority to	Priority to

TNRCC Clean Rivers Program Water Quality Assessment Summary Report

Under §26.0135 of the Texas Water Code, the TNRCC is required to submit to the governor, lieutenant governor, and speaker of the house a summary report of basin water quality assessment reports prepared by CRP contractors. The report is currently prepared biennially, every even-numbered year. To minimize duplication of effort, the requirement for this summary report could be eliminated from the Texas Water Code, and the *State of Texas Water Quality Inventory* report could serve as the summary report for the water quality of the state.

Clean Rivers Program Basin Assessment Reports

Texas Water Code §26.0135(d) requires individual basin assessment reports be submitted to the TNRCC every even-numbered year. The purpose of these basin assessment reports is to provide a comprehensive, uniform analysis of surface water quality for each river basin and summarize public participation and strategic monitoring activities conducted through the CRP. Changes to these assessment reports are listed below.

- 💧 The existing two-year reporting cycle will be revised to allow basin summary reports to coincide with Phase 3. This change would move the current reporting to a five-year cycle. The purpose and content of the basin assessment reports will also change over the next three to four years as more data are collected. Rather than repeat basinwide historic data and/or duplicate status and trends information provided by the interim *State of Texas Water Quality Inventory* reports, the CRP documents will focus on reporting the assessment results of special studies, special basin projects, and changes in water quality which result from specific management strategies. The Clean Rivers Program Team will work closely with the CRP contractors throughout fiscal years 1997 and 1998 to revise the format for basin summary reports. Guidance will be flexible enough to ensure that reports meet the needs of CRP contractors and the basin steering committees.

Building on the Foundation

Future Opportunities for TNRCC Programs to Support Watershed Management

The watershed management approach provides a framework for improved collaboration between water quality programs and other natural resource programs within specific watersheds. Key interactions among OWRM surface water quality management programs that support watershed management have been identified by TNRCC staff. These interactions will be synchronized with the basin management cycle to address water quality issues in priority watersheds. As experience is gained through implementation of the watershed management approach, OWRM water quality management programs could begin to coordinate with additional environmental programs administered by the TNRCC and other state resource agencies. Through collaboration with other programs, additional resources could be leveraged to address priority watershed issues. The organizing principles for improved collaboration are focusing on water quality issues within specific watersheds and targeting regulatory and nonregulatory activities through the statewide basin management schedule.

Expanding cooperative and collaborative efforts to include programs which can support watershed protection will allow for a more comprehensive approach to watershed management. The OWRM anticipates opportunities to collaborate in the near future with the following programs:

- 💧 *Ground-Water Assessment Section:* A third dimension will be added to the watershed management approach by introducing groundwater concerns. In many watersheds, activities on the surface affect the quality of groundwater. The Ground-Water Protection Team is already developing a watershed management approach to groundwater protection by mapping areas of aquifer vulnerability throughout the state. The Ground-Water Nonpoint Source Team implements the state groundwater NPS management program and best management practices to control and prevent groundwater pollution, and coordinates

with the surface water NPS Program. In addition, the groundwater programs are directly involved in projects within specific watersheds, such as the regional aquifer protection project in the Nueces–Rio Grande Coastal Watershed and wellhead protection activities in the Lake Fork Reservoir Watershed. These specific watershed activities could ultimately affect selection of priority watersheds and may eventually be incorporated into watershed action plans.

- 💧 *Corpus Christi Bay National Estuary Program (NEP) and Galveston Bay Estuary Program:* Many fundamental principles of watershed management have already been implemented under the TNRCC's estuary programs. Formed in response to a federal statute designating coastal estuaries as critical aquatic resources requiring special management attention, the Corpus Christi Bay NEP and Galveston Bay Estuary Program must implement comprehensive conservation and management plans in cooperation with other federal, state, and local agencies, develop partnerships with the regulated community, and promote public participation. Participants in a statewide watershed management can learn from the planning experience of these programs, which are addressing cross-jurisdictional issues, assessing cumulative impacts of pollutants, and fostering public involvement. In addition, participants can share information within these regions. Opportunities to collaborate include working with the Environmental Assessment Team of the Corpus Christi Bay National Estuary Program to assess status and trends for wetlands and aquatic habitats, and the Public Participation Team of the Galveston Bay Estuary Program to provide environmental education and distribute results of scientific studies to the public.

In the future, a watershed management approach will have the opportunity to coordinate with other water resource programs within the OWRM. By coordinating with the following programs, the watershed management approach can share technical information, increase public participation, and expand opportunities for voluntary compliance and local action.

- 💧 *Public Drinking Water Section of the Water Utilities Division:* Protecting vulnerable public water supply wells and surface water intakes are critical concerns in watershed management. In implementing the Safe Drinking Water Act, the Public Drinking Water Section is responsible for maintaining drinking water quality from both surface water and groundwater supplies at levels needed to protect public health. In doing so, this section monitors and assesses human health risks, evaluates the vulnerability of water supplies to contamination, develops sampling protocols and related QA/QC procedures, and locates sources of contamination of drinking water. Sharing information across programs could prove critical in successfully addressing issues in priority watersheds within river basins, as well as providing the Public Drinking Water Section with valuable data on potential sources of contamination and aquifers at risk.
- 💧 *The Source Water Protection Program:* Administered by the Public Drinking Water Section, this program delineates wellhead protection areas or zones. The Source Water Protection Program recognizes that differences in geography and communities necessitate diverse remedies. The program does not mandate land use restrictions within critical zones, but it does identify threatening activities and promote voluntary compliance. Sharing ideas from the Source Water Protection Program through the watershed management approach on how to promote local initiatives, “self-help” projects, and interagency cooperation could provide an excellent opportunity for collaboration.
- 💧 *The Groundwater Protection Committee:* Composed of representatives from nine state agencies with groundwater protection authorities, this committee strives to identify areas where new or existing groundwater programs could be enhanced to prevent the degradation of the state's groundwater supplies. The Committee is required to develop and update a comprehensive groundwater protection strategy for the state that provides guidelines for preventing contamination, conserving groundwater, and coordinating interagency activities. The committee meets quarterly. Where appropriate, opportunities for coordination between the Groundwater Protection Committee and CRP basin steering committees should be pursued.
- 💧 *Texas Lake and River Cleanup Program:* The Texas Lake and River Cleanup Program is a volunteer effort of the TNRCC to involve civic organizations, private companies, schools, youth groups, and individuals in

cleaning waters and shorelines throughout Texas. Collaborating with this program to synchronize its efforts with the basin management schedule can generate public support for watershed management.

- 💧 *Agriculture Programs:* The OWRM's agriculture programs are responsible for issuing water quality permits and conducting the technical review for concentrated animal feeding operations. In addition, these programs provide technical support related to water quality goals and regulations to agricultural production systems in Texas, other state and federal agencies, and the general public. Since agricultural production systems can result in point and nonpoint source pollution, significant coordination and collaboration with agriculture programs and stakeholders is necessary for an effective watershed-based approach to water quality management.

Watershed management activities primarily center on water resource issues. However, opportunities may exist to collaborate with TNRCC programs such as those in waste management and pollution prevention, which can foster a more comprehensive approach to water resource protection.

- 💧 *Office of Pollution Prevention and Recycling (OPPR).* The OPPR works with industry, businesses, state and local governments, communities, educational institutions, civic organizations, and individuals across Texas to develop a nonregulatory approach to reducing pollution and waste. The OPPR serves as the state's clearinghouse for information on pollution prevention and waste reduction. To encourage cost-effective and voluntary solutions to problems identified in the watershed, the watershed management program could benefit from the OPPR's extensive technical assistance and training programs. The program also maintains the state's *Toxics Release Inventory*, which provides information on what chemicals are produced and disposed of within watersheds. In exercising their "right to know," citizens are empowered with valuable information on the public health and environmental risks within their watershed. The *Toxic Release Inventory* is an effective tool in encouraging public participation and fostering public education.
- 💧 *Small Business Assistance Program:* This program helps guide businesses through the process of getting permits or claiming exemptions. It provides plain-language information on pollution prevention techniques for specific industries, as well as the forms and instructions that businesses need to fully comply with environmental regulations. For example, the program has issued guidance to assist small businesses in the safe handling of hazardous waste. To encourage voluntary compliance and innovative solutions, CRP contractors could encourage stakeholders who run small businesses to seek help from the program in understanding the environmental rules with which they must comply and the effect of their operations on environmental quality within their watershed.
- 💧 *Local Government Assistance Program:* This TNRCC program is a valuable resource for cities and counties within a watershed. In coming into compliance, local governments could tap the program for technical assistance with permit applications and in the search for solutions to their water quality problems.

Updating the OWRM Guidance Manual

Through the eventual adoption of standard operating procedures and revised work plans, the TNRCC will formally adopt guidance and recommendations provided in this document. The TNRCC considers this document to be a permanent tool for TNRCC programs to use as they coordinate their day-to-day activities with the statewide watershed management approach. The OWRM will update guidance as the implementation of the approach becomes more efficient and refined.

The first revisions to this draft document occurred in December 1996, based on comments from OWRM and EPA staff. Other revisions may occur, if deemed necessary, in response to outcomes of the tasks outlined in Table 6-1. Also, the document may be updated in fiscal year 1998 or 1999 as an outcome of more effective coordination and collaboration among programs and stakeholders through implementation of the initial phases.

Stakeholder List

Watershed Planning Process Stakeholders

Below is a partial list of groups that may play a role in the development and implementation of the watershed management approach.

GOVERNMENT

FEDERAL

Agency for International Development
Agency for Toxic Substances and Disease Registry
U.S. Army Corps of Engineers
Bureau of Land Management
Bureau of Reclamation
Consolidated Farm Service Agency
U.S. Department of Agriculture
U.S. Department of Defense
U.S. Department of Energy
Department of Health and Human Services
U.S. Department of Transportation
U.S. Environmental Protection Agency
U.S. Forest Service
Federal Emergency Management Agency
U.S. Fish and Wildlife Service
General Services Administration
Natural Resources Conservation Service (SCS)
National Oceanic and Atmospheric Administration
National Biological Survey
National Park Service
U.S. Geological Survey

INTERSTATE/INTERNATIONAL

Border Governors Association
Food and Agriculture Organization
International Boundary and Water Commission
Tribal governments
Mexico
Arkansas
Colorado
Louisiana
New Mexico
Oklahoma

STATE

Office of the Adjutant General
Office of the Attorney General
Bureau of Economic Geology
General Land Office
Office of the Governor
Texas Legislature
Navigation districts
Texas Agricultural Extension Service
Texas Bureau of Economic Geology
Texas Railroad Commission
Texas Department of Agriculture
Texas Department of Health
Texas Department of Information Resources
Texas Department of Public Safety, Division of
Emergency Management
Texas Department of Transportation
Texas Forest Service
Texas Historical Commission
Texas Natural Resources Information System
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Texas State Soil and Water Conservation Board
Texas Water Development Board
University of Texas
Texas A&M University
University of North Texas

CITY/COUNTY GOVERNMENTS

City councils
County commissioners
Local health districts
Local irrigation districts
Mayors
Parks and recreation departments
City managers
Public works departments
Water and wastewater departments

REGIONAL AGENCIES

Agriculture Resources Protection Authority
 Alamo Area Council of Governments
 Ark-Tex Council of Governments
 Brazos Valley Development Council
 Capital Area Planning Council
 Central Texas Council of Governments
 Coastal Bend Council of Governments
 Concho Valley Council of Governments
 Houston-Galveston Area Council
 Angelina & Neches River Authority
 Brazos River Authority
 Canadian River Municipal Water Authority
 Central Colorado River Authority
 Cibolo Creek Municipal Authority
 Colorado River Municipal Water Authority
 Guadalupe-Blanco River Authority
 Gulf Coast Hazardous Substance Research System
 Gulf Coast Waste Disposal Authority
 Gulf Coast Water Authority
 Lavaca-Navidad River Authority
 Lower Colorado River Authority
 Lower Concho River Water and Soil Conservation
 Authority
 Lower Neches Valley Authority
 Nueces River Authority
 Palo Duro River Authority
 Red Bluff Water Power Control District
 Red River Authority of Texas
 Rio Grande Valley Municipal Water Authority
 Rio Grande Valley Pollution Control Authority
 Sabine River Authority of Texas
 San Antonio River Authority
 San Jacinto River Authority
 Sulphur River Basin Authority
 Trinity River Authority
 Upper Colorado River Authority
 Upper Guadalupe River Authority
 Upper Neches River Municipal Water Authority
 Rio Grande Compact Commission
 Soil and water conservation districts
 Underground water conservation districts

LOCAL GOVERNMENTS AND SPECIAL COMMITTEES

Barton Springs/Edwards Aquifer Conservation District
 Flood control districts
 Irrigation districts
 Rio Grande Council of Governments
 Texas Alliance of Groundwater Districts
 Texas Association of Counties
 Texas Association of County Judges
 Texas Association of Regional Council
 Texas Ground Water Association
 Texas Metropolitan Sewer Association
 Texas Municipal League
 Texas Utilities Electric
 Water and Sewer Districts
 TNRCC Water Well Drillers Advisory Council

BUSINESS

Privately owned water utilities
 Privately owned electric utilities
 South Texas Development Council (Laredo)
 Texas Board of Realtors
 Texas Cattle Feeders Association
 Texas Chemical Council
 Texas Shrimpers

AGRICULTURE

Agriculture Resources Protection Authority
 Agricultural Advisory Committee
 Texas Farm Bureau
 Texas Irrigation Council
 Texas Rural League
 Texas Rural Water Association

PUBLIC (UNIVERSITIES, ORGANIZATIONS)

Audubon Society
 Environmental Defense Fund
 Gulf Coast Conservation Association
 Houston Advanced Research Center
 League of Women Voters
 National Watershed Coalition
 Natural Resource Defense Council
 Sierra Club
 Sportsmen Conservationists of Texas
 Texas Center for Policy Studies
 Texas Section ,American Wastewater Association
 Texas Water Conservation Association

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Glossary

BED LOAD	Particles of sand, gravel or soil carried by the natural flow of a stream on or immediately above its bed.
BEST MANAGEMENT PRACTICE (BMP):	A practice or combination of practices determined to be the most practicable means of preventing or reducing, to a level compatible with water quality goals, the amount of pollution generated by nonpoint sources. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.
BIOCHEMICAL OXYGEN DEMAND (BOD):	The quantity of oxygen utilized primarily in the biochemical oxidation of organic matter in a specified time and at a specified temperature.
CLASSIFIED WATERWAYS:	Water bodies that have designated uses as set forth by the State of Texas Water Quality Standards.
CLEAN RIVERS PROGRAM (TEXAS CLEAN RIVERS ACT):	Regional water quality assessment program established by the Texas Legislature in 1991.
DISSOLVED OXYGEN:	The amount of free (not chemically combined) oxygen in water. Usually expressed in milligrams per liter.
ECOREGION:	A broad geographic area delineated by regional patterns in land surface form, land use, natural vegetation, and soil type. Streams derive their chemical and biological character primarily from the climate, topography, substrate, biota, and culture of the watershed they drain. Therefore, an ecoregion approach to stream classification is useful for describing the regional variability of water chemistry, instream habitat, and fish community structure.
ECOSYSTEM APPROACH:	A long-term planning and management commitment to ensure the appropriate integration of ecological, economic, and social factors in order to restore, maintain and enhance the quality of the environment to best meet current and future needs.
EMPOWERMENT:	Shared decision making. Maximization of ownership by participants.
GEOGRAPHIC UNIT:	An area based primarily on hydrologic boundaries adjusted as needed using a specified set of criteria to accommodate the inventory and analysis of natural resources. A geographic unit can vary in scale depending on the criteria used, the level of inventory and analysis needed, and the problems perceived. In all cases, geographic units incorporate both groundwater and surface water.
GROUNDWATER RECHARGE:	The addition of water to the zone of saturation. Infiltration of precipitation and its movement to the water table is one form of natural recharge.
HYDROLOGIC UNIT AREA (HUA):	A set of maps depicting approved boundaries of, and numerical codes for, river basins of the United States, developed by the United States Geological Survey. These maps and associated codes provide a standardized base for use by water resources organizations in locating, storing, retrieving, and exchanging hydrologic data.

INTERMITTENT STREAM:	A stream that flows only part of the time. Flow generally occurs for several weeks or months in response to seasonal precipitation, due to groundwater discharge, in contrast to an ephemeral stream, which flows but a few hours or days following a single storm.
LOAD:	The total amount of material (point or nonpoint source) carried by a stream or river. Plural: loads or loadings.
METADATA:	The criteria that define a data field. For example, for the data field “family income,” the metadata might include the type of currency, time period (annual, lifetime), what constitutes a family, what constitutes income, and so on.
NATURAL SYSTEMS:	The interaction of atmospheric, terrestrial, and aquatic forces and processes within the ecosystems of the natural environment.
NONPOINT SOURCE (NPS) POLLUTION:	Human-made or human-induced pollution caused by diffuse, undefinable sources that are not regulated as point sources, resulting in the alteration of the chemical, physical, biological, and/or radiological integrity of the water.
PERENNIAL STREAM:	A stream that normally has water in its channel at all times.
PUBLIC AWARENESS:	Perception, realization, or knowledge the public has or shows of a particular topic.
PUBLIC OUTREACH INITIATIVES:	Any event, publication, exhibit or display, speech, meeting, or other activity intended to educate the general public or regulated community and build support for environmental programs.
PUBLIC PARTICIPATION:	Those occasions when the public takes part in, shares in, and influences the outcome of issues, events, or policy decisions. Open forums, public meetings, surveys, and task forces are among the methods used to provide the opportunity for public participation.
QUALITY ASSURANCE:	An integrated system or program of activities involving planning, quality control, quality assessment, reporting, and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.
QUALITY ASSURANCE PROJECT PLAN:	A quality assurance project plan (QAPP) provides a project- or task-specific blueprint for an environmental data operation to ensure that the results obtained are of the type and quality needed. The purpose of the QAPP is to reduce the risk of the user’s making an incorrect decision because of faulty data. The QAPP applies methods of quality assurance and quality control to achieve this goal.
QUALITY CONTROL:	The overall system of routine technical activities, the purpose of which is to measure and control the quality of a product or service so that it meets the needs of the user.
RIVER BASINS:	The 23 historically recognized drainage areas for the major rivers and coastal areas within the state of Texas.

STAKEHOLDERS:	Any entities involved in or affected by watershed management activities within a watershed. The term “stakeholders” covers a broad range of people and organizations, including government agencies, nongovernmental organizations, businesses, agricultural entities, the public, and the regulated community.
STREAM SEGMENT:	Surface waters of an approved planning area exhibiting common biological, chemical, hydrological, natural, and physical characteristics and processes. Segments will normally exhibit common reactions to external stresses (e.g., discharge or pollutants). Segmented waters include most rivers and their major tributaries, major reservoirs, and lakes, and marine waters which have designated physical boundaries, specific uses and specific numerical physicochemical criteria. Segments are classified in the water identification system utilized by the TNRCC OWRM and are the management unit to which water quality standards and regulations are applicable under the Clean Water Act.
TOTAL DISSOLVED SOLIDS (TDS):	An aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, etc., of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. High-TDS solutions have the capability of changing the chemical nature of water. High TDS concentrations exert varying degrees of osmotic pressures and often become lethal to the biological inhabitants of an aquatic environment.
TOTAL MAXIMUM DAILY LOADS (TMDLs)	A written, quantitative assessment of water quality problems and contributing sources, which identifies responsible parties and specifies actions needed to restore and protect water quality standards. TMDLs must include allocations for permitted point source discharges, nonpoint sources, and a margin of safety in setting the total amount of pollutants that a water body can safely assimilate. The margin of safety cannot be used as a set-aside for future growth or impacts to the water body.
TOTAL SEDIMENT LOAD:	The sum of the bed load and the suspended sediment load.
UNCLASSIFIED WATERS:	In Texas, those waters for which no classification has been assigned, and which have not been identified in Appendix A of Title 30 Texas Administrative Code.
WATERSHED:	An area bounded peripherally by a water divide and draining to a particular water course or body of water. Topography is the primary determinant of watershed boundaries. These boundaries are subject to change based on the needs of individual criteria.
WATER QUALITY STANDARDS (WQS):	Acceptable limits on water quality parameters are set by the state, with review by the EPA, so that when enforced they will meet the goals of the Clean Water Act.